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Year Ends With Much Promise

Producers Well Booked Three Months Ahead, Operations Continue on the Rise and Outlook Is Best in Several Years—Semifinished Material Tightens and Advances—Pig Iron and Steel Strengthen Further

THE iron and steel industry is winding up 1924 with production on a high plane, with bookings heavy and active and with prospects, altogether, the most promising of any year since the war. Mills and furnaces are filled with orders to the extent that the present or a greater gait of operations is assured for the first quarter at least. In some lines, certain mills are obligated with 50 per cent more tonnage than one year ago. Compared with 1923 and 1924, which also began with promises that were not fully realized the new year is starting with an unusually favorable combination of fundamental factors promising strong business.

Works activities have continued to expand and their normal modification at the holiday season will be less this year than usual. The Carnegie Steel Co. is putting on three more blast furnaces, making seven in all added in two weeks. Three more stacks have been started at Chicago where ingot output is averaging 87 per cent. Youngstown sheet mills will reopen Dec. 29 with 100 per cent of capacity active. General steel production is placed at 80 to 85 per cent.

IRON TRADE REVIEW composite of 14 leading iron and steel products closes the year with another gain which raises it to $40.70, the highest point since June. One year ago the composite stood at $43.03 and two years ago at $40.65.

Prices Gain Strength

Steel prices are gathering strength steadily. Semifinished material has grown scarcer for first quarter delivery and has advanced $2 or more. Leading makers of sheet bars are well sold up to April 1. One round lot went in the week at $38, Pittsburgh, a later tonnage at $39 and small quantities at $40. Various producers now are asking $40. Plates are firmer with $1 advance this week by a leading Pittsburgh producer to 1.95c, minimum. Most mills are holding at 2.00c.

English and domestic makers of ferromanganese have advanced prices to $110 seaboard, duty paid, following liberal sales of the alloy at the old figure of $105.

Plate bookings at Chicago have been unusually brisk, originating from railroad car and oil tank requirements. A number of other lots of this character are in the market. Chicago tin plate mills are filled up for the first half with the result that consumers there are applying to Pittsburgh for tonnage at a cost substantially $3 higher.

Big Awards Made

Building steel awards again have gone to a high total this week or 54,795 tons. Three jobs, alone call for 37,000 tons including 18,000 tons for a bridge at Pittsburgh and 10,000 and 9000-ton buildings at New York. The volume of work actively pending or definitely planned is heavy, aggregating several hundred thousand tons. At least 75,000 tons is in prospect at Chicago with a like total pending in the East.

Indications are at least 10,000 more cars will be placed before January by the Missouri Pacific, Burlington, Baltimore & Ohio and other roads. New car orders include 2000 by the Louisville & Nashville. The Baltimore & Ohio has inquired for 3000. The Soo Line and the Pere Marquette have bought 10,000 tons of rails each and the complete Southern Pacific order calls for 60,000 tons. The leading producer at Chicago this week booked 26,000 tons of tie plates in addition to other track fastenings.

The coke market is higher and unsettled. Spot and first quarter coke is quoted from $4.25 to $5, following the wage advance.

Scrap buying has been active at higher prices. Heavy melting steel is bringing $22 at Pittsburgh and Youngstown where sales the past week are estimated from 100,000 to 125,000 tons.

Iron Again Higher

Higher coke prices have given pig iron another boost and a further advance of 50 cents to $1 per ton is general this week. Buying is pressing forward into second quarter, the most notable instance being the 60,000 tons placed by the American Radiator Co. but on account of the uncertainty over coke costs, the furnaces are acting warily so far ahead. Chicago prices are up to $23.50 with $24 in sight.

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What Will the Year 1925 Bring Forth?

BUSINESS will be better in 1925, but how much better? And in what lines will the improvement be most pronounced? These questions are asked by business and industrial executives. They have heard and read forecasts of a more or less general character; now they want specific facts. They want to know "what, when and where." Iron Trade Review's Yearbook of Industry, as the annual number is known, will contain articles by a number of business and industrial leaders outlining the probable course of events in each of their respective divisions in 1925. These will give the reader a clear insight into the future of those industrial groups which underlie the prosperity of the iron and steel, and related business. Collectively, these articles represent an important survey of probable 1925 steel and equipment requirements. One of the valuable features in the Yearbook, out Jan. 1.

Loose Rolling of Sheets. Page 1706.

Cross Sections of Industry

"The average number of employes per steel mill is 750. Including blast furnaces, the average drops to 675 per establishment."—*From IRON TRADE REVIEW'S Survey, "Lubrication".*

Pig Iron Prices Advanced $1 Due to Coke Wage Increase—Moderate Buying Precedes Holidays—Shipments Heavy

PITTSBURGH, Dec. 23.—Sales of pig iron in the week just closed were confined to small tonnages, with prices trending upward. While one producer made a few sales of foundry iron at $22, another interest reports the sale of two carloads of this grade at $23, valley. Quotations of $22 are outstanding on No. 2 foundry iron in case of regular customers, and indications are that some buyers will have the privilege of taking tonnage on this basis. While No. 2 iron is quotable from $22 to $23, an increase of $1 a ton since a week ago, the minimum is rapidly tending toward the latter figure. A consumer in Ohio now in the market for a round tonnage of basic is unable to develop a price below $22, valley. One maker still will consider small tonnages of this grade at $21.50, while another has set a price of $23 on any basic tonnage. A few district sales of this grade have been made. Quotations are up 50 cents since a week ago, now standing at $21.50 to $22. One merchant interest has available a small tonnage of off-grade basic, but is making no effort to dispose of the material, anticipating strong market conditions. Sales of bessemer are scarce. Producers are quoting from $22.50 to $23, valley, 50 cents above last week's asking price. Malleable is quotable at $22, valley but is in little demand. Sales of a few hundred tons of low phosphorus were entered at $29, valley. On carload lots a quotation of $29.50 was made.

Boston Market Active

Boston, Dec. 23.—While large tonnage sales have been infrequent during the week, an encouraging run of small orders has kept the pig iron market active. Foreign iron has sold freely in some localities at prices slightly under the domestic levels, without in any way weakening the general price situation. The tendency in Buffalo and eastern Pennsylvania is toward higher prices for the higher silicon irons. No. 1X (2.75 to 3.25 silicon) is held at $1 above the No. 2X grade by all active sellers and one prominent furnace is asking a $1.50 differential. With inquiry for second quarter at present on the increase buying after the first of the year bids fair to continue active. Practically all of the large melters in this district are covered for first quarter and buying by these at present is either for spot delivery to cover immediate needs or for second or third quarter use. Confidence in high prices throughout the first half of 1925 is gaining rapidly among consumers.

Profit Is Reduced

Philadelphia, Dec. 23.—Pig iron producers say the effect of the coke advance will reduce or wipe out profit on recent business. Some makers who sold most of their first quarter output will be unable to book sufficient business at current prices to get a satisfactory average. The effect also is to make the advancing tendency more pronounced. Eastern Pennsylvania foundry iron now is $23.50 to $24, base furnace, plus silicon differentials ranging all the way from 50 cents to $1.50. Preparations are being made to blow in several more furnaces for the first quarter, but actual decision to light is postponed awaiting developments in the market. Current demand here is quiet. Basic is featureless. Moderate tonnages of low phosphorus have been sold at unchanged prices Virginia iron continues $24 to $24.50, base furnace, plus 50-cent differentials.

Buying Heavier at New York

New York, Dec. 23.—Pig iron demand has expanded considerably here. This improvement was unexpected in view of the recent heavy business. It is estimated that sales over the past week in this territory aggregated over 25,000 tons. In addition at least 12,000 tons now are pending. The American Radiator Co. has revised its second quarter inquiry a couple of times and while it now is in the market for 4000 tons for that position, for Bayonne, N. J., the company is expected to buy as much as 10,000 tons for that plant. The Crucible Steel Co. of America is figuring on a large tonnage of basic, low phosphorus and malleable iron for its Atha Works at Harrison, N. J., where it plans to resume operations. It is understood that the American Tube & Stamping Co. recently closed for some basic. The American Locomotive Co. has closed for an additional tonnage and the New York Central railroad has bought 900 tons. Substantially all of the iron sold the past week is for shipment in the first quarter, but some tonnage was closed for the second quarter at the same prices as for the first quarter. Prices are higher. On Buffalo foundry the usual price now is $23, base furnace, plus 50 cents for 2.25 to 2.75 silicon, with an additional dollar for the 2.75 to 3.25 silicon grades. On eastern Pennsylvania foundry the prices range from $23.50 to $24 base furnace, plus 50 cents to $1 for 2.25 to 2.75 silicon and an additional dollar to $1.50 for the 2.75 to 3.25 silicon grade.

Price Corrected

Through a typographical error, the quotation on malleable pig iron, valley, was given as $20.50 to $21, valley, in the full page price table on page 1611 of the Dec. 18 issue of IRON TRADE REVIEW. This should have been $21.75 to $22 or $22.51 to $23.76, Pittsburgh. The single price of $22, valley, as the representative market figure in the table of Prices Present and Past on page 1610 of the Dec. 18 issue was correct as given.

Buffalo Makers Advance Prices

Buffalo, Dec. 23.—Price advances averaging $1 a ton have been put in effect by practically all Buffalo Pig iron makers as a result of higher coke prices. They say this advance may not fully cover the increased cost of coke. Some furnaces have enough coke on hand or under contract for 60 days. Current inquiry is estimated at 12,000 tons, including one lot of 2000 tons and another of 1000 tons. The American Radiator Co. has bought a very substantial tonnage for its branches. Buffalo furnaces have established first quarter prices on the following level: No. 2 foundry, $23; No. 2X, $23.50; No. 1X, $24.50. It is said these prices are firm. One maker has sold the output of its merchant furnace for the first quarter, and another is out of the market temporarily. The larger makers are booking first quarter business, and have sold approximately 25 per cent of their production. Sales of the past week were checked by the advance in prices.

Prices Are Higher

Cleveland, Dec. 23.—Moderately active business, accompanied by rising prices, describes the pig iron market. The American Radiator Co. got in under the wire before prices were advanced in the last few days on the strength of the coke market. It has closed for about 60,000

tons for the second quarter, for its various plants. A lake furnace took about 7000 tons of this for the Detroit plant; and 4000 tons also was closed by the radiator company for Springfield, O. Other sales made by furnace interests with headquarters here during the week amounted to around 35,000 tons. With the radiator company's business, distributed in various districts, the total of sales that can be computated here is close to 100,000 tons. Inquiries now pending are estimated at 50,000 to 75,000 tons, including several good size lots of basic. The advance in coke, brought about by the increase in wages in the Connellsville district, has had a strong influence on the market. Some pig iron makers are uncertain as to the full effect of it and are reluctant to quote. Cleveland furnaces have advanced prices 50 cents to $1. One has closed several sales at $22.50, furnace, or $23 in the local switching area, while another has made sales at $23, furnace, for nearby delivery. It now holds to this price for local and outside delivery on foundry and basic iron. The lake furnace price is up to $22.50, an advance of $1 in the week. A merchant furnace company is quoting $23, valley, on some inquiry. It sold several lots of foundry iron at $22, base, Buffalo furnace, during the week, and one lot of No. 1 iron at $23.50. Its southern Ohio price now is over $22. Sellers in territory in Michigan and Indiana say Chicago makers are asking $23 to $23.50. Shipments in December have been better than they were during November. Another large buying movement is expected to develop immediately after the holidays.

Several inquiries are pending for basic iron. The American Steel Foundries, Alliance, O., wants 5000 tons. A user in the Pittsburgh district is asking for prices on 3000 tons monthly through the first quarter. One Ohio buyer wants 1000 tons, and another 500 tons. The Andrews Steel Co. that was in the market for 25,000 tons last week is reported to have closed on a portion. Basic is held by some sellers at $22, valley, and the spread of the market is $21.50 to $22.

A movement is underway to make Cleveland a central delivery point for Lake Superior charcoal iron, the same as Chicago and Buffalo, bringing in the iron by boat. The railroad rate to Chicago is $3.04, while the water rate to Buffalo, including handling charges is approximately $2.50.

Now at $23, on Way Up

Chicago, Dec. 23.—Northern No. 2 foundry and malleable iron are now firmly on the basis of $23.50, base, furnace, with every prospect for a further advance. Considering the extent of the buying movement and costs, with emphasis on the advance in Connellsville coke, producers believe they have followed a conservative course. With the market so strong that some look for $24 iron by the end of this week, producers are not anxious to fill up. Many melters seem apprehensive over their unplaced requirements. Most inquiries are in the neighborhood of 1000 tons. A milwaukee and a northern Illinois melter each is in the market for 1000 tons, while a Milwaukee interest wants 1500 tons of malleable and foundry. A Chicago interest has placed 3000 tons of basic here for its valley works. The American Radiator Co. is understood to have closed for its western plants, including one lot of 17,000 tons. Melters continue to clamor for shipments.

Another Federal furnace may be in this week, to be followed shortly by an Iroquois stack. Charcoal iron is unchanged at $26, furnace, or $29.04, Chicago. Southern iron has advanced not quite so rapidly as northern but the freight handicap still is too great. Following several sales of 1000 tons each, low phosphorus iron is quiet.

Southern Ohio Market $22

Cincinnati, Dec. 23.—Practically all northern foundry iron under $22 Ironton appears to have disapeared and the market is firming at the level of $22 for first quarter, although the leading producer is asking $22.50. Another furnace interest in the Ironton district is quoting $22 for first quarter and will consider second quarter business at $23, furnace. The market on southern iron is firm at $20, Birmingham, with the Tuscaloosa Co. asking $20.50. Furnaces quoting $20 are the Rockwood, La Follette and Sloss-Sheffield, while the

(*Concluded on Page* 1681)

Prices Present and Past

Representative market figures yesterday, and for last month, three months ago and one year ago

	Dec. 24, 1924	Nov., 1924	Sept., 1924	Dec., 1923
PIG IRON				
Bessemer valley, del., Pitts.	$24.26	22.11	21.76	24.17
Basic, valley	21.50	19.25	19.00	20.50
Basic, eastern del., eastern Pa.	23.63	21.46	20.00	23.30
*No. 2 foundry, del. Pitts.....	23.76	21.36	21.26	23.77
No. 2 foundry, Chicago	23.50	21.00	20.50	23.00
*Southern No. 2, Birmingham..	20.00	17.90	17.65	20.75
*Southern Ohio, No. 2, Ironton	22.00	20.90	20.00	22.50
**No. 2X, Virginia furnace	24.50	24.50	24.50	24.50
**No. 2X, eastern, del. Phila....	25.13	22.98	21.26	24.26
Malleable, valley	22.00	19.75	19.50	21.50
Malleable, Chicago	23.50	21.00	20.50	23.00
Lake Superior charcoal, Chicago	29.04	29.04	29.04	29.04
Gray forge, val., del Pittsburgh	23.26	20.76	20.76	23.27
Ferromanganese, del., Pitts....	109.79	107.29	97.79	113.79
SEMIFINISHED MATERIAL				
Sheet bars, bessemer, Pittsburgh	39.00	37.00	37.50	42.50
Sheet bars, open-hearth, Pitts....	39.00	37.00	37.50	42.50
Billets, bessemer, Pittsburgh	36.00	35.50	37.10	40.35
Billets, open-hearth, Pittsburgh	36.00	35.50	37.10	40.35
FINISHED MATERIAL				
Steel bars, Pittsburgh	2.10	2.05	2.05	2.40
Steel bars, Chicago	2.10	2.05	2.05	2.50
Steel bars, Philadelphia	2.32	2.295	2.37	2.72
Iron bars, Philadelphia	2.47	2.345	2.32	2.62
Iron bars, Chicago mill	2.00	2.10	2.15	2.40

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

	Dec. 24, 1924	Nov., 1924	Sept. 1924	Dec., 1923
FINISHED MATERIAL (Continued)				
Beams, Pittsburgh	2.10	2.00	2.00	2.50
Beams, Philadelphia	2.32	2.12	2.22	2.72
Beams, Chicago	2.20	2.15	2.10	2.60
Tank plates, Pittsburgh	1.95	1.85	1.95	2.50
Tank plates, Philadelphia	2.32	2.02	1.97	2.72
Tank plates, Chicago	2.20	2.15	2.10	2.60
Sheets, blk., No. 28, Pittsburgh	3.50	3.45	3.45	3.75
Sheets, blue anl., No. 10, Pitts.	2.70	2.60	2.70	2.95
Sheets, galv., No. 28, Pittsburgh	4.75	4.60	4.60	4.90
Sheets, black, No. 28, Chicago..	3.75	3.65	3.75	4.10
Sheets, blue anl. No. 10, Chicago	2.85	2.85	2.95	3.35
Sheets, galv. No. 28, Chicago	4.90	4.75	4.85	5.20
Wire nails, Pittsburgh	2.85	2.75	2.80	3.00
Wire nails, Chicago	3.00	2.95	3.10	3.35
COKE				
Connellsville furnace, ovens	4.50	3.00	3.00	3.85
Connellsville foundry, ovens	5.75	4.05	4.00	4.80
OLD MATERIAL				
Heavy melting steel, Pittsburgh	21.50	19.85	18.60	18.35
Heavy melting steel, eastern Pa.	21.00	18.05	17.75	16.80
Heavy melting steel, Chicago ...	19.50	17.05	16.40	16.00
No. 1 wrought, eastern Pa.....	20.50	18.95	18.75	19.00
No. 1 wrought, Chicago	19.25	17.10	16.70	16.35
Rails for rolling, Chicago	20.75	18.20	17.40	17.05

Composite Market Average

Representing the Combined Average Prices Per Ton of Fourteen Leading Iron and Steel Products Yesterday, One Week, One Month, Three Months, One Year and Ten Years Ago.

Dec. 24, 1924	Dec. 17, 1924	Nov., 1924	September, 1924	Dec., 1923	Dec., 1914
$40.70	$40.14	$39.00	$39.05	$43.02	$21.58

Products Included Are Pig Iron, Billets, Slabs, Sheet Bars, Wire Rods, Steel Bars, Plates, Structura Shapes, Black, Galvanized and Blue Annealed Sheets, Tin Plate, Wire Nails and Black Pipe

Iron and Steel Prices

SCRAP PRICES, PAGE 1730; WAREHOUSE, ORE, PAGE 1720; NUTS, BOLTS AND RIVETS AND PIPE PRICES, PAGE 1732

Pig Iron

Prices per gross ton

Bessemer, valley	$22.50 to 23.00
Bessemer, Pittsburgh	24.26 to 24.76
Basic, valley	21.50 to 22.00
Basic, Pittsburgh	23.26 to 23.76
Basic, Buffalo	22.50 to 23.00
Basic del., eastern Pa.	23.50 to 24.00
Malleable, valley	22.00
Malleable, Pittsburgh	23.76
Malleable, Cleveland, del	22.50 to 23.50
Malleable, Chicago	23.00
Malleable, Buffalo	23.00
Malleable, del., eastern Pa.	25.50 to 27.01

FOUNDRY IRON SILICONS

No. 2 Northern	1.75 to 2.25
No. 2 Southern foundry	1.75 to 2.25
No. 2X Eas'n and Virgina	2.25 to 2.75
No. 1X Eastern	2.75 to 3.25
No. 1 Chicago	2.25 to 2.75
No. 2 foundry Eastern	1.75 to 2.25

No. 1X, eastern del., Phila.	26.26
No. 1X, Buffalo	24.50
No. 1 foundry, Chicago	24.00
No. 2 foundry, valley	22.00 to 23.00
No. 2 foundry, Pittsburgh	23.76 to 24.76
No. 2 foundry, Buffalo	23.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Granite City	24.00 to 24.50
No. 2 foundry, Ironton fur.	22.00 to 22.50
No. 2 foundry, Cleveland, del.	22.50 to 23.50
No. 2 foundry, del., Phila.	24.63 to 25.26
No. 2 foundry, N. J., tidewater	24.63 to 25.39
No. 2X, eastern del., Phila.	25.13 to 26.76
No. 2X, east. N. J. tidewater	25.76 to 26.39
No. 2X, eastern del., Boston	27.15 to 27.65
No. 2X, foundry, Buffalo fur.	23.50
No. 2X, Buffalo, del., Boston.	27.91 to 28.41
No. 2 southern, Birmingham	20.00
No. 2 southern, Cincinnati	24.05
No. 2 southern, Philadelphia	27.80
No. 2 southern, Chicago	26.01
No. 2 southern, Cleveland	26.01
No. 2 southern Boston (rail and water)	26.91
No. 2 southern, St. Louis	24.17 to 25.17
No. 2X, Virginia furnace	24.50 to 25.00
No. 2X, Virginia, Phila.	29.67 to 30.17
No. 2X, Virginia, Jersey City	30.04 to 30.54
No. 2X, Virginia, Boston	30.42 to 30.92
Gray forge, eastern Pa.	23.00 to 23.50
Gray forge, val. del., Pitts.	23.26 to 24.26
Low phos., standard, valley	29.00 to 29.50
Low phos., standard, Phila.	29.79
Low phos., Lebanon, furnace	26.00
Charcoal, Birmingham	30.00
Charcoal, Superior, Chicago	29.04

Silvery iron, Jackson county, Ohio, furnace, 7 to 8 per cent, $29.00; 8 to 9 per cent, $30.50; 9 to 10 per cent; $32.50; 10 to 11 per cent, $34.50; 11 to 12 per cent, $37.00; 12 per cent, $39.50.

Bessemer ferrosilicon, Jackson county, Ohio, furnace, 10 to 11 per cent, $39.50; 11 to 12 per cent, $42.00; 12 to 13 per cent, $44.50.

Ferroalloys

†Ferromanganese 78 to 82 per cent, tidewater, or furnace first hand and resale	$110.00
Ferromanganese delivered Pittsburgh	114.79
Spiegeleisen 19 to 21 per cent domestic furnace or tidewater	32.00 to 34.00
Ferrosilicon, 50 per cent contract freight allowed	80.00 to 82.50
Ferrotungsten standard, cents per pound contained	82.00 to 88.00
Ferrochrome, 60 to 70 chromium, 6 to 8 carbon, cents per pound contained, del.	11.00 to 11.50
Ferrovanadium, 30 to 40 per cent per pound estimated, according to analysis	3.25 to 3.75
Ferro-carbon-titanium, car lots, producer's plant, net ton	200.00

†Duty paid.

Coke

Beehive, Ovens
Prices per net ton

Connellsville, furnace	4.25 to 5.00
Connellsville foundry	4.75 to 6.00
New river foundry	8.50 to 9.00
Wise county furnace	4.00 to 4.25
Wise county foundry	4.50 to 5.00
Alabama furnace	4.00 to 4.50
Alabama foundry	4.50 to 5.25

By-Product

Foundry, Newark, N. J., del.	$10.41
Foundry, Chicago, ovens	10.75
Foundry, New England del.	11.50
Foundry, St. Louis	11.00
Foundry, Granite City, Ill.	9.00
Foundry, Alabama	4.50 to 5.25

Semifinished Material

Prices per gross ton

BILLETS AND BLOOMS
4 x 4-inch and larger

Pittsburgh and Youngstown	$36.00 to 38.00
Philadelphia	41.80 to 43.80
Chicago	35.00 to 38.00
Forging, Pittsburgh	41.00 to 42.50
Forging, Philadelphia	46.80 to 48.80

SHEET BARS

Pittsburgh and Youngstown	38.00 to 40.00

SLABS

Pittsburgh	36.00 to 37.00
Youngstown	36.00 to 37.00

WIRE RODS
¼-inch and finer

Pittsburgh	$48.00
Cleveland	48.00
Chicago	49.00 to 51.00

Standard extras, $2.50 per ton over ¼-inch; $5 for screw stock; $15 for acid wire rods. Carbon extras, $3 for 0.20 to 0.40; $5 for 0.41 to 0.55; $7.50 for 0.56 to 0.75; $10 over 0.75.

SKELP

Grooved skelp, Pittsburgh	2.00c
Universal skelp, Pittsburgh	2.00c
Sheared skelp, Pittsburgh	2.00c

Structural Shapes

Prices per pound

Pittsburgh	2.10c
Philadelphia	2.32c to 2.42c
New York	2.34c to 2.44c
Chicago	2.20c
Cleveland	2.19c to 2.29c
Birmingham	2.15c to 2.20c

Steel Plates

Pittsburgh	1.95c to 2.00c
Philadelphia	2.32c
New York	2.34c
Chicago	2.20c
Cleveland	2.14c to 2.19c
Birmingham	2.05c to 2.15c

Iron and Steel Bars

Pittsburgh, soft steel	2.10c
Pittsburgh, cold finishing	2.25c
Pittsburgh, forging quality	2.35c
Philadelphia, soft steel	2.32c to 2.42c
New York, soft steel	2.34c to 2.44c
Chicago, soft steel	2.10c
Cleveland, soft steel	2.29c
Birmingham, soft steel	2.25c to 2.30c
San Francisco, soft steel	2.45c
Pittsburgh, refined iron	2.90c to 4.50c
Pittsburgh, reinforcing billet	2.10c
Chicago, rail steel	2.03c
Mill, rail steel	1.90c to 2.00c
Philadelphia, common iron	2.47c
New York, common iron	2.49c
Chicago, common iron	2.00c to 2.05c

Hoops, Bands, Strip

Prices per pound f.o.b. mills

Hoops, Pittsburgh, under 3 in.	2.40c to 2.50c
Hoops, Pittsburgh, 20 gage, under 1 in	2.75c to 3.75c
Bands, Pittsburgh	2.40c to 2.50c
Hot rolled strip steel, Pittsburgh stamping quality	2.40c
Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100-inch and heavier, base, Pittsburgh, Cleveland.	4.00c to 4.15c

Chicago and Worcester, Mass. $3 per ton higher.

Cold Finished Steel

Prices per pound

Cold finished steel bars, drawn or rolled Pittsburgh, Chicago, carloads	2.80c
Less carloads	3.05c
Steel shafting, turned and polished Pittsburgh, Chicago	2.80c

Screw stock base Cleveland $1 higher; and Worcester $3 higher than Pittsburgh and Chicago.

Rails, Track Material

Standard bessemer rails, mill	$43 00
Standard open-hearth rails, mill	43.00
Relaying rails, St. Louis	27.00 to 32.50
Relaying rails, Pittsburgh	27.00 to 30.00
Light rails, 25 to 45, mill	1.80c to 1.90c
Angle bars, Chicago base	2.75c
Spikes, railroad, Pittsburgh	2.90c
Spikes, small railroad, 7/16-inch and smaller, Pittsburgh	3.20c
Spikes, boat and barge, Pitts.	3.25c
Spikes, railroad, Chicago	2.90c
Track bolts, Pitts. standard	3.75c to 4.00c
Track bolts, Chicago	3.90c
Tie plates, Pittsburgh	2.35c to 2.50c
Tie plates, Chicago	2.35c

Spike, tie plate and truck bolt prices for carlots.

Wire Products

To Jobbers in Carloads
Prices per pound

F.o.b. Cleveland and Pittsburgh base

Wire nails	2.85c
Galv'd nails, 1-inch and over	5.10c
Plain wire	2.60c
Annealed wire	2.75c
Galvanized wire No. 9 gage	3.20c
Barbed wire, painted	3.30c
Barbed wire galvanized	3.55c
Polished staples	3.30c
Galvanized staples	3.55c
Coated nails, count keg	2.25c
Woven wire fencing (retailers) 12½ gage, 26-in. high 7 bars and 12-in. stays per 100 rods, f.o.b. Pittsburgh	$20.56

Joliet, DeKalb and Waukegan, Ill., $2 per ton over Cleveland-Pittsburgh base on products made there. Worcester, Mass., and Fairfield, Ala., $3 higher. Duluth $2 higher. Chicago delivered price $3 higher, Anderson, Ind., $1 higher.

Sheets

Prices per pound

SHEET MILL BLACK

No. 28, Pittsburgh base	3.50c to 3.60c
No. 28, Philadelphia, delivered	3.82c to 3.92c
No. 28, Gary, Indiana Harbor	3.70c
No. 28, Chicago, delivered	3.75c

TIN MILL, BLACK

No. 28, Pittsburgh base	3.50c to 3.60c
No. 28, Gary base	3.70c

GALVANIZED

No. 28, Pittsburgh, base	4.75c
No. 28, Philadelphia, delivered	4.92c to 5.07c
No. 28, Gary Indiana Harbor	4.85c
No. 28, Chicago, delivered	4.90c

BLUE ANNEALED

No. 10, Pittsburgh base	2.70c
No. 10, Philadelphia, delivered	3.02c to 3.12c
No. 10, Gary, Indiana Harbor	2.80c
No. 10, Chicago, delivered	2.85c

AUTOMOBILE SHEETS

No. 22, Pittsburgh, base	4.60c to 4.75c

Tin Plate

Prices per 100-pound box, Pittsburgh

Tin plate, coke base	$5.50

Gary, Ind. base 10 cents higher

Iron and Steel Pipe

Base Discounts Pittsburgh and Lorain, O. to Jobbers in Carloads

	Black	Galv.
1 to 3-inch, butt steel	62	50½
1 to 1½-inch, butt iron	30	13

Indiana Harbor, Ind., and Evanston, Ill., 2 points less and $4 per ton higher. Chicago delivered 2½ points less and $5 per ton higher.

Boiler Tubes

Less Carload Discounts—Carloads 4 Points Additional—f.o.b. Pittsburgh Mills

Steel 3¼ to 3¼-inch	38½
Charcoal iron, 3¼ to 4½-inch	5
Seamless hot rolled, 3½ to 3¼-inch.	35

Chain, Piling, Cut Nails

Prices per pound

Chain, 1-in. proof coil, Pitts.	6.25c
Sheet piling base, Pittsburgh	1.95c to 2.05c
Cut nails, f.o.b. mills	2.90c

Hot Rolled Alloy Steels

Price per pound, Pittsburgh base

S. A. E. Series—	
2300 (3½ per cent nickel)	4.75c
3100 (nickel chromium)	3.65c to 3.75c
6100 (chrome vanadium)	4.50c to 4.75c
6100 (Chrome vanadium spring)	4.00c to 4.25c
9250 (Silico manganese spring)	3.15c to 3.50c

Billets—4 x 4 to 10 x 10, gross ton at net ton bar price; under 4 x 4 to 2½ x 2½-inch, $5 higher.

Chicago base $2 per ton above Pittsburgh.

Scrap Holds Upward Trend

Higher Prices and Better Demand by Dealers and Consumers Maintain Market in Strong Position Despite Inventory Caution

SCRAP PRICES, PAGE 1730

Chicago, Dec. 23.—Trading in iron and steel scrap by dealers continues to outrun consumer buying both in price and volume, with the market still moving up in this double formation. Heavy melting steel has sold up to $19.75 in good sized lots between dealers and this grade appears to warrant a spread of $19.50 to $20. Both grades of malleable are stronger, largely due to the unsatisfied requirements of a larger user who is now offering $21, gross ton, for the railroad grade. No. 1 cast has also moved up; quotations on both grades of cast are based more upon the asking price of dealers than actual sales inasmuch as the market generally has firmed up since cast was traded in on a large scale. The advance in No. 2 busheling is more to maintain a $4 spread under No. 1 busheling, as No. 2 busheling has not been sought lately. In general, the market has moved up 50 cents a ton in the past week. Frequently consumers are able to place their needs at lower prices than some brokers are offering. Cold weather is exected to slow the movement of scrap and hence is regarded as a bull factor.

Activity Well Sustained

Boston, Dec. 23.—Contrary to expectations the iron and steel scrap market has held active right up to Christmas. Borings and turnings are in strong demand throughout New England and sales of accumulated stocks offered by various manufacturers are reported at record prices. The Whitin Machine Works, Whitinsville, Mass., sold several hundred tons of borings close to $16. Strictly railroad steel has been sold at $16.25 shipping point. At the moment demand for heavy melting steel for Pennsylvania steelworks is dull but moderate nearby demand has appeared with the result that prices at Boston are spotty, sales having been recently reported all the way from $13.75 to $15.50 shipping point. The cast grades are in renewed demand with prices following pig iron upward. Strictly textile scrap has sold at $22 delivered and 200 tons of machinery scrap was placed with a Massachusetts consumer at $20 delivered. Steel car axles and steel shafting have been marked up 50 cents.

Prices Strong in East

New York, Dec. 23.—Consuming demand for most grades of scrap is still lacking, but prices tend strongly upward. During the past week dealers have boosted their buying prices on about 10 grades. Cast scrap is one of the few items at the moment in good consuming demand. Northern New Jersey foundries are buying this material in good quantities. Buying of heavy melting steel is still backward, but the first of the year ought to see a material change.

Higher Prices Are Firm

Philadelphia, Dec. 23.—Another eastern consumer has bought 10,000 tons of heavy melting steel at $21, delivered, which now is the firm price for all eastern points except Bethlehem, which is about $1 less owing to a lower freight rate from New York. A fair scattered business has been the feature of the week, some consumers holding up shipments until after the new year to hold inventories low.

Buffalo Prices on Rise

Buffalo, Dec. 23.—Although large consumers in the Buffalo district insist they are out of the market and declare they will need little iron and steel scrap early in the first quarter dealers continue to absorb all offerings and are holding prices at or higher than the levels recently established. Buying by dealers is broad, limited only by offerings. Ideas of the real value of heavy melting steel are at variance. Bethlehem, offering $17.50, is getting no attention from dealers, according to the latter. Dealers have paid $20.50 for material for delivery to Donner on old contracts it is said and might buy steel of this quality as high as $21. One large jobber is holding No. 1 steel for $22. A Cleveland consumer has embargoed turnings but Buffalo tonnage is held at $14 to $14.50. Low phosphorus has been sold at $23 and $23.50 is now asked. Stove plate inquiry is beginning to reassert itself. Dealers are asking $16.50 but sales are reported to have been made recently at $16. Hydraulic bundles are rather slow as are loose bundles. There is inquiry for car wheels within the price range of $20 to $20.50. One jobber reports having sold malleable at $21 which is above the last quoted price. No. 1 railroad wrought is lower, around $17.50. Some dealers report scarcity of desirable scrap at reasonable prices and are having difficulty replenishing stocks.

Quotations Based on Sales

Pittsburgh, Dec. 23.—A sale of approximately 10,000 tons of heavy melting steel was made early this week at $22 for shipment to a consumer in this district. During the week just closed, from 20,000 to 25,000 tons of heavy melting steel have been sold in the Pittsburgh district while in the Youngstown district from 75,000 to 100,000 tons has been absorbed. The majority of this tonnage was placed at $22. At present dealers are selling only in small tonnages. For the most part they decline large quantities because they are not sure that present prices will not be topped owing to the recent display of strength in the pig iron market. Practically all prices have advanced and quotations are based on sales. Cast iron borings, however, are quoted at $16.50 to $17 owing to a letup in demand.

Market Is Uneventful

Cleveland, Dec. 23.—Iron and steel scrap appears to be marking time in this district, consumers not being dis-

(*Concluded on Page* 1686)

Sheet Bar Price Is Stronger

Small Tonnages Sold Around $40—Heavy Inflow of Finished Steel Orders Reflected in Increasing Specifications

SEMIFINISHED STEEL PRICES, PAGE 1677

Pittsburgh, Dec. 23.—Improvement in specifications for sheet bars, billets and slabs noted for two or three weeks past, still continues. Mills are showing much less anxiety than a couple of months ago and no longer are soliciting business openly. Many will need all the semifinished material they can produce to cover the needs of their own conversion departments and those of their regular customers. This applies to the Carnegie Steel Co., which is making no announcement concerning prices. The trend of prices is toward a higher level, with some makers no longer disposed to quote less than $40 on sheet bars. Some have taken contracts at $37, some at $37.50 and $38, and shipments now are being made on these. One district producer maintains he will not consider less than $39 on any tonnage of sheet bars.

Rerolling billets and slabs are quotable from $36 to $37. Practically all sellers are adhering to the size differential on rerolling billets. On small billets some producers are quoting $37.50; forging billets are being held at $41 as a minimum and some producers are naming $42. The majority of shipments are being billed at $40.50, or $5 above the $35.50 price which recently ruled on 4 x 4-inch rerolling billets.

Open market inquiry on skelp lacks any semblance of activity. Producers are naming 2.00c as a minimum. Shipments to regular customers on contracts which were taken at 2.00c and below now are being made. Some of this material is going regularly to Canada. Wire rods still command $48, with some makers inclined to hold off from becoming further obligated believing they will need the material later on. Most shipments on old contracts carry $45 to $46.

A large consumer in northern Ohio closed within the week for 10,000 tons of sheet bars for first quarter delivery at a reported price of $38, Pittsburgh. It is understood the steel will come from the Pittsburgh district. Since then another sale of considerable tonnage has been made at $39.

Place 20,000 Tons of Billets

Chicago, Dec. 23.—Two 10,000-ton lots of small billets are reported to have been placed in this district in the past ten days at the equivalent of $35, Chicago. For small lots of billets the minimum is claimed to be $38, Chicago.

Sales Made at $40

Cleveland, Dec. 23.—The market for semifinished material continues strong, with an upward tendency. While most large users have covered first quarter requirements, a few sales have been made recently at higher prices than those at which some important con-

tracts were taken. A fair size tonnage of small billets and slabs have been booked at $40, Cleveland, and this also is believed to represent the market here for sheet bars.

Good Tonnage Sold at $39

Youngstown, Dec. 23.—Much strength has developed in the semifinished steel market here, due to heavy inflow of finished steel orders. Sheet bars and small billets are scarce and show every indication of going to $40, mill, when any needy customers apply. A good tonnage of sheet bars for fill-in purposes went a few days ago within $1 a ton of that price. Only regular customers are being taken care of by the leading mills here on semifinished.

Eastern Prices Stronger

Philadelphia, Dec. 23.—Semifinished prices are stronger. Several round lots of billets were sold last week. Practically all old prices now have disappeared. Rerollers are held at $37 to $38, base Pittsburgh, plus $5 for forging quality. Some makers, on account of a shortage of steel for their finishing departments, are not offering billets.

Tin Plate Buyers

In Chicago District Must Purchase at Pittsburgh—Mills More Active

TIN PLATE PRICES, PAGE 1677

Pittsburgh, Dec. 23.—Tin plate specifications for the closing days of 1924 have been heavy from the larger can makers, enabling the leading producer to increase operating schedules. A week ago it operated 66 per cent of capacity, and during the week just closed this was increased to 70 per cent. While further increase may be interfered with this week and next owing to the holidays, the general trend is higher. Much material has been rolled in advance of actual contracts being signed for shipment in the new year. The output of the Gary works of the leading producer for first half is under contract in its entirety and as a result consumers in the Chicago district now are compelled to come to Pittsburgh mills for their requirements. Producers here have been approached for tonnage and have quoted $5.50 per base box, plus 34 cents freight, or $5.84 delivered Chicago, against their recent quotations of $5.70 at Chicago. A shortage of labor in hot mills is becoming apparent and it is likely that operating schedules will not be increased much above their present level.

Buys 140,000 Boxes

New York, Dec. 23.—The Standard Oil Co., of New York has placed 140,000 boxes of tin plate with the Bethlehem Steel Co. and the McKeesport Tin Plate Co. The tin plate will be used for making oil cans for the export trade.

Lock Washer Prices Vary

Chicago, Dec. 23.—Lock washer prices show a wide range, with as high as 85, 10, 10 and 10 off being done on large business and the average-sized placement taking 85 and 5 off. An average of wrought washer quotations is $6 off.

Coke Prices Advanced

Furnace Grade Up to $4.25 to $5; Foundry Fuel $4.75 to $6—Wage Increase Affects Many Contracts

COKE PRICES, PAGE 1677

Pittsburgh, Dec. 23.—Adjustments incidental to the Dec. 16 wage advance of 50 per cent for employes of independent coke producers in the Connellsville district are keeping the coke market somewhat unsettled. Some surprise was caused among consumers by the early posting of the increase. The important producers with output fully obligated for first quarter say they found they had to check the drift of labor to operations paying higher wages. Since shipments on first quarter contracts start in the third week of December, they inaugurated the advance to hold working organizations. They now are quoting $4.75 to $5 for spot and first quarter shipments. Ovens just starting up quote $5 minimum.

They are not yet ready to quote on three or four inquiries for the second quarter, including one from a broker, another from a pig iron producer's selling agent, and a third from a carbon furnace company whose furnace needs two or three months preparatory work for blast. A few coke producers without backlogs are quoting $4.25 to $4.50 for spot delivery. One blast furnace interest picked up a small amount of distress coke at $3.75 last week. A few blast furnaces are endeavoring to collect a little surplus coke tonnage for over the holidays, when Christmas celebrations in the region may reduce output and limit contract shipments. A typical inquiry of this character specifies 20 carloads. Medium sulphur and heating coke are comparatively weak at $3.35 and $3.50 quoted on the small inquiries pending. Cullings and first drawings bring $3 to $3.25. Foundry coke also is showing strength because of the wage increase. Quotations run all the way from $4.75 to $6 on spot, and $5 to $6 on contracts. Premium brands are higher. A few inquiries out from foundries are not fully covered.

Independent and corporation coke ovens fired in the Connellsville region during the week just closed totaled 2400 bringing the production in that district to about 60 per cent of the 1918 output. The H. C. Frick Coke Co. lighted 1150 units and the W. J. Rainey Co. 880. The other ovens were distributed among other independent producers. Last week the Producers Coke Co. posted a new wage scale at its Century plant conforming to the recent advance.

Production in the week ended Dec. 13 was 121,426, compared with 119,550 in the preceding week, according to the *Connellsville Courier*.

Wise County Prices Higher

Cincinnati, Dec. 23.—The blast furnace coke trade here is devoid of activity, except for deliveries on contracts. Prices below $4 ovens on the Wise county grade are disappearing. The minimum spot market price on Wise county furnace coke is $4 with some producers asking $4.25. The Ashland By-Product Coke Co. has announced there will be no change in its foundry and domestic coke prices for January shipment. Coke specifications for January already exceed the total for December by 25 per cent. Demand for foundry coke has eased off slightly. The Louisville & Nashville railroad closed on its inquiry for 750 tons of foundry coke, the order going to a Wise county producer.

New England Demand Active

Boston, Dec. 23.—Increased melt at foundries combined with the desire to build up stocks of coke at the present price levels has resulted in a strong demand for by-product coke in this market despite the holidays. The new wage scale in the Connellsville district is expected to be reflected in fuel prices here in the near future and this stimulates all fuel buying. The price for by-product foundry coke still is $10.50 delivered.

Foundry Demand Brisk

St. Louis, Dec. 23.—Demand for foundry coke continues brisk. Purchasing is mainly for prompt delivery, and as heretofore, the business goes almost exclusively to local by-product manufacturers. Provision for future needs is confined almost entirely to renewals of expiring contracts. Industrial purchasing holds up well, with good buying by the water, gas and bakery interests, and improvement in the salamander trade. Prices on all grades remain unchanged.

Southern Market Firm

Birmingham, Ala., Dec. 23.—Southern coke is selling somewhat better than it did during the past few months. Quotations remain firm at $4.50 to $5 for the foundry grade, from by-product and beehive ovens. The Republic Iron & Steel Co. has let a contract to the Koppers Co. for a battery of 57 ovens at its by-product plant in Birmingham. Work will start next month on excavations.

Consuming More Ore

ORE PRICES, PAGE 1732

Cleveland, Dec. 23.—The tonnage of Lake Superior iron ore on lower lake docks and at furnaces Dec. 1 was 2,658,431 tons less than last year. The iron and steel industry has 40,178,035 tons available, and while no shortage is anticipated the amount on hand at the opening of navigation next year is variously estimated at 2,000,000 to 3,000,000 tons below normal. No interest appears in the market for next year. The Lake Superior Iron Ore association gives the following figures relating to consumption and stocks:

	Tons
Ore consumed in October	3,497,792
Ore consumed in November	3,688,726
Increase in November	190,934
Ore consumed in November, 1923	4,441,477
Ore on hand at furnaces Dec. 1, 1924	32,128,759
Ore on Lake Erie Docks Dec. 1, 1924	8,049,276
Total at furnaces and Lake Erie docks Dec. 1, 1924	40,178,035
Total, Dec. 1, 1923	42,836,466

Users Take Bars Freely

New Bookings in Good Volume but Specifications Exceed Orders—Jobbers Anticipate Demand and Order Heavily—Prices Tend Upward

BAR PRICES, PAGE 1677

Chicago, Dec. 23.—While new business in soft steel bars is being booked at a good rate, specifications passed to mills exceed bookings. One maker states that while he can accommodate fill-in business he is through contracting for first quarter. Slightly better buying by automotive interests has developed in the past week. Considerable freight car steel has been placed recently. Schedules are such that the holiday shutdowns will be cut to a minimum. Cold weather is slightly retarding shipments. In outlying points some irregularity continues in bars but in the greater part of the Chicago district 2.10c, Chicago, governs.

Rail steel bar mills have worked up comfortable backlogs and another maker is going on double turn. This is the result of continued good buying by all classes of users. The delivered price of rail steel bars in Chicago is 2.03c.

Bar iron business is fair, showing no decided tendency either way. The range is still 2.00c to 2.05c, Chicago.

New England Buying Revives

Boston, Dec. 23.—Following the slight lull of a week ago, bar sales are again active and prices are firmer than at any time this month. One leading producer announces an increase effective Jan. 1 and most large buyers feel that this is a good time to cover on first quarter requirements. Warehouses have been heavy buyers. The price of 2.465c delivered corresponding to 2.10c Pittsburgh is rock bottom in this market.

Most Consumers Covered

Philadelphia, Dec. 23,—Most steel bar consumers have covered for the first quarter at 2.00c, Pittsburgh. Some makers now hesitate to shade 2.10c on new business although 2.00c has not yet disappeared. It is difficult to buy iron bars under 2.15c, Pittsburgh.

Jobbing Demand Is Strong

Pittsburgh, Dec. 23.—To be in position to meet increased demands of buyers shortly after the first of the new year, jobbers of merchant steel bars have been liberal with specifications during the past two weeks. Various manufacturers utilizing this material have sent in large orders and the year is closing with bar mills active on increased schedules. Shipments are heavy for this time of the year on contracts, new orders are coming in at a fair rate and the market is firm at 2.10c, although a large proportion of outgoing business is being billed at 2.00c or less. Some bar mills are on practically full schedules with others at 80 per cent.

Makers of refined iron bars report increased interest on the part of their customers as well. Most of the current buying and specifying is being done by railroad car shops and some attractive orders lately have been booked. The absolute minimum price now is 2.90c, with a tendency to quote 3.00c and even 3.10c is becoming manifest. Up to 4.50c is quoted on double refined iron.

Buffalo Expects Advance

Buffalo, Dec. 23.—Rumors that bar prices will be advanced Jan. 1 have caused many consumers to cover for first quarter. The present price is 2.365c, Buffalo.

Specifications In Good Volume

Cleveland, Dec. 23.—Specifications for steel bars are coming to the mills in larger volume than was looked for at this period. Some sellers report the tonnage for the first three weeks in December was 50 per cent over that in November, a heavy month. Many buyers are ordering that their tonnage be shipped out early after Jan. 1. A fair amount of new business is being put through and on this the price is uniformly 2.10c, Pittsburgh or 2.29c, Cleveland. Deliveries on steel bars still can be made by an early date but in bands, especially the wide descriptions, have been extended and on these classifications large producers are sold up for three months.

Cold Bars Well Sold

Pittsburgh, Dec. 23.—Much of the cold-finished output of mills in this district for first quarter has been obligated, and judging from the way specifications come in shipments against these contracts will be large. A little tonnage is coming out but this is of a miscellaneous character. The present price is firm at 2.80c, f.o.b. Pittsburgh district mills. Present operating schedules average 60 per cent of capacity but this will be increased shortly after the first of the year.

Hoop, Band Orders Large

HOOP PRICES, PAGE 1677

Pittsburgh, Dec. 23.—Bookings of hoops and bands during the past two or three weeks has been unusually heavy. It is understood that most of these orders, against which specifications already are coming in, have been received from automobile interests and auto part makers. Prices are firm at a 2.40c minimum, while some are quoting 2.50c. On material 1-inch and narrower a wide range of quotations prevails, 2.75c to 3.75c marking the full spread with 2.75c to 3.00c more common. Limited production possibilities of the mills rolling these exceedingly narrow hoops makes it necessary to obtain higher figures.

Nut, Bolt Buying Larger Since Price Rise

NUT AND BOLT PRICES, PAGE 1732

Pittsburgh, Dec. 23.—First quarter obligations by nut and bolt makers in this locality are expanding since the recent announcement of a price advance which is nominal in view of the fact that the freight rate is being absorbed over a wide selling area. The basis of these contracts is 50, 10 and 10 off for large machine bolts. Jobbers have been ordering at a fairly good rate and manufacturers also have been placing business at an attractive rate. First quarter contracting for rivets has been progressing at a fair pace during the past two weeks or so at the fourth quarter price of 2.60c for structural rivets and usually at 70, 10 and 5 off for small rivets. Some fabricating shops and railroad shops have placed large orders.

Contracting at Good Rate

Chicago, Dec. 23.—Makers of bolts and nuts are experiencing no difficulty in taking fourth quarter business on the basis of the recent advances in prices. Not only is contracting satisfactory but specifications against fourth quarter contracts also are better. Relatively speaking, the implement industry is a better buyer than the automobile industry. The market is on the basis of 50, 10 and 10 off for large machine bolts.

Large Volume Is Booked

Cleveland, Dec. 24.—Bolt and nut producers are receiving a large volume of business principally for first quarter. One maker reports that within the past 10 days it has been almost swamped with business, both for spot and first quarter shipmeint, while another states that orders so far this month are more than double those of November. Orders are being received from all classes of consumers.

Rivet demand has shown decided improvement during the past few days. Producers report contracts for first quarter are being received daily from all lines of consumers and indications are demand will continue to improve. Prices are firm at 2.60c Pittsburgh and 2.75c Chicago.

Strip Buying Holds Well

STRIP PRICES, PAGE 1677

Pittsburgh, Dec. 23.—Bookings of hot and cold-rolled strip steel for first quarter shipment to automotive and allied interests have been entered at an attractive rate during this month. Specifications are being received daily in attractive volume, since the material is wanted for conversion into parts early in the new year. On wider sizes of hot strips, 2.25c still is available although indications of this price advancing are apparent. On widths 10 inches and under, 2.40c is the going quotation. Attractive orders of cold strips can be placed at 4.00c with certain interests, although there is a tendency to get this grade on a 4.15c level. Business has been entered at the latter figure for first quarter shipment. The volume, however, is small compared with that accepted recently at $3 per ton lower.

First Quarter Completely Booked

Chicago, Dec. 23.—A maker of cold rolled strip steel estimates that his present bookings are sufficient to carry him through the first quarter at a 24-hour gait. Practically all classes of users have been heavy buyers recently. Cold rolled strip is strong on the basis of 4.15c, Chicago.

A schedule in bankruptcy has been filed by the Gotham Auto Body Co., Inc., 207

East Forty-seventh street, New York, with liabilities of $13,996 and assets of $2000, consisting of stock.

Pig Iron Advances $1

(*Concluded from Page* 1676)

Pioneer and Woodward furnace interests are out of the market. Aside from the purchase of 3800 tons of northern foundry iron by the American Radiator Co. for its Springfield, O., plant, sales in the past week were of small consequence. The Springfield business, it is reported went to a southern Ohio furnace interest. The Norfolk & Western railroad bought several hundred tons of Virginia iron, while a sale of 150 tons of southern iron to the American Elevator & Foundry Co., Louisville, Ky., also was noted. Sellers report a slightly improved demand for silvery and bessemer iron.

More Interest in Basic

St. Louis, Dec. 23.—The principal feature in pig iron is the revival of interest in basic. The St. Louis Coke & Iron Co., reports sales totaling 12,000 tons, including 4000 tons to an east side interest and 500 tons to a melter in Iowa. About 15,000 tons is pending and likely to be closed within the next week or ten days. The trend of prices is sharply upward. One southern maker has raised its price to $20.50, and no iron from that section is obtainable under $20. Chicago is firm at $22.50, with several small tonnages reported here at that figure. The leading local producer has advanced its price $1 to $24 to $24.50, f.o.b. Granite City. Offerings from all quarters are considerably less abundant than heretofore, and there is a decided shortage of certain grades, notably high silicons. Consumers of foundry iron apparently are well covered for all they will use before Jan. 1. A substantial tonnage remains to be bought for the first quarter. The smaller users have done relatively little, and all indications point to their having to pay higher prices when they enter the market.

Southern Makers See Large Demand

Birmingham, Ala., Dec. 23.—Southern furnace interests through inquiries and other indications see demand for a large tonnage of iron in prosepect. One of the larger melters is negotiating now for a round tonnage. Sales of iron for immediate delivery are reported at $20.50, but the market base is given as $20. Only one company is selling in the open market. Other companies either are well supplied with business or are waiting an opportune time to re-enter the market and sell for future deliveries. Reports are current that one melter has taken 25,000 tons of iron again for its southern plant, while other sales of 2500 tons to 10,000 tons are said to have been closed. The Tennessee Coal, Iron & Railroad Co. will not be in the open market much longer as its new extensions will be nearing completion soon and will need a large amount of basic iron. At present the company is selling some foundry iron.

The Sloss-Sheffield Steel & Iron Co. announces that its Gadsden No. 1 and City No. 1 furnaces will go in blast Jan. 1.

Car Plates Feature Sales

Heavy Tonnage Closed at Chicago—New Tanks Also Bring Larger Bookings—Leading Interest Advances Its Price

PLATE PRICES, PAGE 1677

Pittsburgh, Dec. 23.—While one or two large producers of plates still are willing to entertain business at 1.90c, the majority of mills are asking 2.00c. Some are quoting 2.05c and 2.10c and are not anxious to consider business at 2.00c unless in attractive lots. Bookings have been fair from fabricating shops and specifications for shipment shortly before or after the first of the year have been heavy. District plate mills are operating from 80 to 85 per cent of capacity. On Dec. 1 according to the bureau of navigation, department of commerce, American shipyards were building or had under contract to build for private ship owners, 161 vessels. Of this number, the American Bridge Co. in this district is credited with 42 steel vessels of 18,500 tons; to the Dravo Construction Co., 38 vessels aggregating 16,400 tons, and the Marietta Mfg. Co., Point Pleasant, W. Va., eight vessels of 2724 tons. The United States engineers office at Cincinnati will take bids until Jan. 8 on two 70-foot diesel electric stern wheel tow boats involving from 400 to 500 tons of plates apiece.

The Youngstown Boiler & Tank Co. secured orders for several more 55,000-barrel oil storage tanks for Texas oil fields in addition to the 14 now being fabricated.

Railroads in Market

Cincinnati Dec. 23.—The Louisville & Nashville railroad has purchased 1500 tons of plates and sheets for first quarter. The order went to the Tennessee Coal Iron & Railroad Co. The Big Four railroad is in the market for its first quarter requirements, which includes, plates, sheets, nails and bars, although the tonnage is not specified.

Car and Tank Business Large

Chicago, Dec. 23.—Car builders have been in the plate market in earnest the past week. Combined with business from the Texas and Oklahoma oil fields, they have given the plate makers more business than in the preceding two weeks put together. One maker has booked 5000 tons for tank work in the new Wortham field. The Manitowoc Shipbuilding Corp., Manitowoc, Wis., is inquiring for 3000 tons for a lake steamer. From a Pacific coast yard is an inquiry for 4000 tons for an ocean steamer. The Pan-American Petroleum Co. has placed six 37,500-barrel tanks. The Chicago district quotation on plates is 2.20c, Chicago, with competition bringing some irregularity at outlying points.

Prices Are Quoted Higher

Cleveland, Dec. 23—Continued strengthening of plates is apparent. Several mills which have been quoting under 2.00c, Pittsburgh or 2.19c, Cleveland have advanced to that figure as a minimum, this including some local makers. The Carnegie Steel Co. has raised its minimum $1 per ton to 1.95c, Pittsburgh or 2.14c, Cleveland, effective this week. Specifications are reported by local sellers to be better than they anticipated at this time of the year and a number of users are asking for delivery early in January to keep this tonnage out of inventories. At least one lake freighter is being bid and others are reported in prospect. More than 1000 tons of plates is involved in an engineering undertaking now up for figures.

Current Demand Quieter

Philadelphia, Dec. 23.—A fair amount of plate tonnage has been sold for first quarter. Current demand, however, is somewhat quieter. The general asking price is 2.00c, Pittsburgh, and in most cases lower prices have disappeared. Makers point out advancing costs necessitate higher plate prices.

Plates About To Advance

Boston, Dec. 23.—Eastern mills are closing their books on certain sizes of plates for first quarter delivery and several have announced an advance in price effective Jan. 1 from the present level of about 2.265c, delivered, to 2.515c delivered. Demand is reported by one of the leading producers as more insistent than at any time during the past year. The Bethlehem Steel Co. is increasing its plate operations at Lackawanna to care for some of the rising eastern demand.

Canadian Work Active

Washington, Dec. 23.—Consular reports advise the department of commerce that a highway will be built along the line of the Canadian Pacific railroad in British Columbia at a total cost of about $715,000. As the country is mountainous, a great amount of work will be required. Construction of a large steel bridge across Fraser river, at a cost of $250,000, also is planned. A $1,500,000-department store addition is to be built soon in Vancouver, British Columbia.

Rate Report Not Ready

A. R. Kennedy, traffic manager of the Pittsburgh Steel Co., Pittsburgh, and chairman of the traffic association committee formed in Pittsburgh Oct. 30, to work out mutual problems of freight rates arising from the abolition of the Pittsburgh basing point practice, has announced that the report of that committee will not be ready to submit to the railroads before the first of the year. The report will request through rates to western points, saving shippers of the Pittsburgh district about 20 per cent.

Investigate Iron Imports

Philadelphia, Dec. 23.—Treasury department agents are investigating recent importations of Indian pig iron at Philadelphia and Boston. They are seeking to determine whether the iron is being sold in violation of the anti-dumping act.

Concrete Prospects Good

Present Demand for Reinforcing Bars Limited but Inquiries for Spring Building Are Numerous—Prices Continue To Gain Strength

REINFORCING BAR PRICES, PAGE 1677

Chicago, Dec. 23.—Although awards of reinforcing concrete bars are few, warehouses have experienced a decided improvement in estimating in the past week. A large part of this new work consists of large structures which will not go ahead until spring. Holabird & Roche, 104 South Michigan avenue, have plans out for the 34-story addition to the Roanoke building, Chicago. About 1700 tons of bars in a sewer at St. Paul and 800 tons in a building at Kansas City are expected to be awarded any day. In Chicago, quotations for reinforcing bars hold fairly firm to 2.60c, Chicago, but in outlying points in the Chicago district competition has brought variations.

The 16-story addition to the Furniture Mart, Chicago, for which the Wells Bros. Construction Co., 53 West Jackson boulevard, Chicago, has the general contract, will require 600 to 700 tons, it is stated. If the Hibbard, Spencer, Bartlett & Co., warehouse goes reinforced concrete, the tonnage of bars required will total several thousand; Graham, Anderson, Probst & White, 80 East Jackson boulevard, Chicago, are the architects. Plans are said to be under way in the office of Alfred S. Alschuler, 28 East Jackson boulevard, Chicago, for a north side project requiring several thousand tons.

Boston Inquiry Grows

Boston, Dec. 23.—More and more jobs planned for concrete construction are coming into the market with resultant activity in the estimating departments of local concrete bar dealers. Recent awards have been mostly for 1000 tons and less, however. The price is firm at 2.365c delivered despite the fact that foreign bars are offered at 2.10c c.i.f. Boston.

Market Stiffens Slightly

New York, Dec. 23.—Some of the jobbers in this territory have abandoned the practice of giving free deliveries and now are quoting concrete reinforcing bars at 2.80c base at warehouse, plus a charge for delivery on the job. Otherwise the concrete bar market here is unchanged, Pittsburgh warehouse shipments being 2.30c base Pittsburgh and mill shipments ranging from 2.00c to 2.15c, depending on the business. A good deal of concrete bar business is pending, but there is no haste in placing it inasmuch as buyers do not regard any further price advances as imminent at this time.

Demand Slow; Prices Firm

Cleveland, Dec. 23.—Reinforcing bars are quiet, with less than 300 tons the estimated aggregate bookings by dealers here during the past week. Small-lot contracts are active, but large tonnages are absent. The American Insurance building, Columbus, O., is expected to require around 600 tons. New steel bars are firm at 2.29c, Cleveland, or 2.10c, Pittsburgh, on small lots. An attractive tonnage could develop down to 2.19c, Cleveland, or 2.00c, Pittsburgh. Rail steel bars are firm at 1.90c to 2.00c, mill, with little to test the quotations. Billet bars from stock are firm at 2.50c to 2.60c, Pittsburgh, and 3.10c, Cleveland.

Concrete Sales Lack Volume

Pittsburgh, Dec. 23.—Buying demand for reinforcing concrete bars during the week just closed lacks any semblance of volume. Mills are asking 2.10c on tonnage, while stock out of warehouse is being quoted at 2.30c. About the only fair sized job up for negotiation includes 75 tons for shipment to Johnstown. This order is expected to be closed Jan. 5.

Price Still Holds Firm

Cincinnati, Dec. 23.—Approach of the holiday season has slackened the demand for reinforcing bars and as a result the market here is devoid of features. Enough business is forthcoming in small lots to prevent the market from entering a state of lethargy. Awards the past week involved 50 tons and under. Inquiries are more numerous, but the general disposition among buyers is to hold off purchases until the new year is ushered in. Despite the dullness, prices have not dropped below 2.10c Pittsburgh base.

CONCRETE CONTRACTS PLACED

Awards this week	1,930 tons
Awards last week	3,230 tons
Awards two weeks ago	2,275 tons

500 tons, Salaam Temple, Newark, N. J., to Igoe Bros., Newark. General contractor, Fred Kilgus, Inc.

300 tons, through E. B. Styles Contracting Corp., 35 North Dearborn street, for the Illinois Central railroad, to Concrete Engineering Co.

250 tons, tank foundation for Standard Oil Co. of New Jersey, at Bayonne, N. J., to Jones & Laughlin Steel Corp.

220 tons, Bamberger store addition, Newark, N. J., to Igoe Bros. General contractor, Turner Construction Co.

200 tons, Eitel building, Chicago, to Concrete Steel Co.; this is in addition to 700 tons reported awarded Dec. 4 prior to revision of plans. General contract to Hegeman-Harris Co., 400 North Michigan avenue, Chicago.

180, tons, Wellington Arms apartment, Chicago, to Concrete Steel Co.; this is in addition to 400 tons reported awarded for this job Nov. 27. General contract to Hallbauer & LaBahn, 844 Rush street, Chicago.

100 tons, Illinois road work, to Concrete Steel Co.

100 tons, power house for Staten Island Electric Co., New York, to McClintic-Marshall Co. General contractor, J. G. White Engineering Corp.

100 tons, hospital, Toledo, O., reported awarded unnamed fabricator.

100 tons, coal pocket, Narragansett Electric Light Co., Providence, R. I., to Concrete Steel Co.

100 tons, high school, Warwick, R. I., to Truscon Steel Co.

CONCRETE CONTRACTS PENDING

1500 tons, new unit of city sewage sanitation plant, Cleveland; bids to be asked soon; George B. Gascoigne & Co., that city, engineers.

1000 tons, high school in Philadelphia; general contract awarded Cramp & Co.

800 tons, building at Kansas City for Montgomery, Ward & Co., Chicago. General contract to Wells Bros. Construction Co., 53 West Jackson boulevard, Chicago.

750 tons, theater, New Haven, Conn.. undecided steel or concrete.

670 tons, D. M. Read store, Bridgeport, Conn.; revised figures to be taken.

600 tons, 300 tons for foundations, being figured and 300 tons for superstructure plans just issued, for American Insurance building, 32-story structure, Columbus, O.; pending.

500 tons, Harbor Trust Co. building, Boston, contract expected to go to Concrete Steel Co.

500 tons, Statler hotel, Boston, pending.

400 tons, Maltz warehouse, Brooklyn, N. Y.; general contract awarded R. W. Smith Construction Co.

335 tons, road and bridgework for Randolph county, Mo.; general contract awarded W. H. Shone Co.

250 tons, Bowdoin Square garage, Boston, pending.

250 tons, approaches to Philadelphia-Camden bridge, Philadelphia; O'Neill Construction Co. general contractor.

200 tons, police station, Boston, bids in.

160 tons, building for South Chicago Savings bank, 3017 East Ninety-second street, Chicago. Plans by Ivar Viehe-Naess & Co., 400 N. Michigan avenue.

155 tons, reservoir for Oak Park, Ill. General contract to W. J. Newman Co., 21 North Curtis street, Chicago.

150 tons, Union County courthouse, Elizabeth, N. J.; to be refigured.

150 tons, John Spofford apartment, Boston, bids in.

100 tons, school at Elkins Park, Pa., bids in Dec. 30.

100 tons, school house, New Haven, Conn., pending.

100 tons, Union Institute for Savings, Boston, bids in.

Tonnage unstated, 4-story hotel at 540 Wellington avenue, Chicago, for Realty Building & Construction Co., 177 North State street, Chicago. Plans by Raymond Gregroi, 155 North Clark street, Chicago.

Tonnage unstated, 4-story hotel for George Dimas, 109 North Chicago avenue, Joliet, Ill. Bids to be taken in January by W. W. Alschlager Inc., 65 East Huron street, Chicago.

Pipe Jobbers'

Demand Maintained—Award 60 Mile Line Pipe Order

PIPE PRICES, PAGE 1677 AND 1732

Pittsburgh, Dec. 23.—Small orders for standard full weight merchant pipe from jobbers have been steadily received for many weeks; and practically all pipe makers in this district have good backlogs. This explains why they have been able to maintain operating schedules at 75 or 80 per cent of capacity notwithstanding the dropping off in orders for oil country goods. Orders for the latter grade recently have shown life and a few good bookings for shipment to Texas have been made, a typical order for line pipe being that of the Pure Oil Co. for 60 miles of 8-inch line pipe for installation in Texas, involving 4500 tons of steel.

Prices Steady; Demand Absent

New York, Dec. 23.—While prices in the local cast iron pipe market continue unchanged, trading reflects the holiday lull. Orders during the past few days have fallen off, and insofar as municipal demand is concerned, activity is at a minimum. The increasing prices of raw materials is having a firming influence upon the market.

Minneapolis Places 1600 Tons

Chicago, Dec. 23.—The American Cast Iron Pipe Co. has booked 1600 tons of cast iron pipe at Minneapolis. Madison, Wis., was opening bids today on 600 tons. Jobs on the verge of closing include two, aggregating over 1000 tons, at LaGrange Park, Ill., and one of 400 tons at Villa Park, Ill., both suburbs of Chicago. The cast

iron pipe market is now in the pocket preceding the opening of spring buying. The market is claimed to be on a $40, Birmingham, minimum, making pipe 6 inches and over $48.20, Chicago, and 4-inch pipe $52.20, Chicago. Detroit opens bids, Dec. 29, on 5000 tons.

Market Satisfactory in South

Birmingham, Ala., Dec. 22.—Cast iron pipe demand in the South is satisfactory. A large tonnage is yet to be delivered on orders previously placed. Several specifications are reported also in prospect. Quotations remain firm on the $40 per ton base, 6-inch and over.

CAST IRON PIPE PLACED

2580 tons, 30-inch, class A pipe for Madison, Wis., awarded to United States Cast Iron Pipe & Foundry Co. at $52.35 per ton, and fittings at 6½c per pound.
1600 tons, Minneapolis, to American Cast Iron Pipe Co.

CAST IRON PIPE PENDING

5000 tons, Detroit; bids Dec. 29.

Wire Marks Time

Holiday Lull in Effect but Outlook Is for Increased Demand

WIRE PRICES, PAGE 1677

Chicago, Dec. 23.—Makers of wire and wire products are experiencing a slight lull which they attribute to the desire to keep inventories down. New business, however, averages well with recent week and every indication points to decided improvement after the turn of the year. Operations have not been reduced appreciably on account of the lull. Western delivered prices figure back to 2.70c, base Joliet and Waukegan, for plain wire and 2.95c for nails.

Holiday Bookings Light

Pittsburgh, Dec. 23.—Bookings from jobbers have been light during recent weeks, as compared with bookings about the time of the recent price advance. Present levels are firm on the basis of 2.60c for plain wire and 2.85c for wire nails. While a week or two ago some specifications were held back because shipments were not wanted owing to inventory, some releases now are coming through. Shipments about Jan. 1 or for a month or so after, are destined to be heavy. Some attractive orders for mixed carloads recently have been received. Makers of wire products are operating around 80 per cent capacity although the holiday season undoubtedly will cut this down during the next two weeks.

More Chicago Stacks In

Chicago, Dec. 23.—With the blowing in this week of another stack at South Works of the Illinois Steel Co., Chicago district steel makers will have 27 out of 34 stacks active. Steel ingot operations continue to climb at the rate of several points a week and this week will average about 87 per cent. Christmas and New Year shutdowns will be reduced to a minimum on account of the press of schedules.

All Grades of Sheets Firm

Upward Tendency Especially Noticeable in Black and Galvanized—Orders Continue in Good Volume

SHEET PRICES, PAGE 1677

Youngstown, Dec. 23.—Sheet mills that go down for the Christmas holiday expect to reopen Monday, Dec. 29 with a 100 per cent rate of operations. They have accumulated good backlogs which, with some of them at least, insure such rates of operations for some weeks. Specifications have been heavy. Hence the seasonal lull in buying is really welcomed. Distinct firming up in the sheet bar market is reflected in the stiffer quotations for sheets. While one or two mills in the district still will take No. 28 gage black at 3.50c, Pittsburgh, they are expected to be able to fill up within a few days and then no more of a quotation below 3.60c. In fact, one mill now is trying to get 3.70c for common black sheets. Galvanized sheets are much firmer at 4.75c, due to high zinc prices. Blue annealed is steady at 2.70c. Full-finished or autobody sheets No. 22 gage are furnishing good specifications to mills, with some small volume of new buying. Quotations are growing far steadier around 4.75c, and it is the belief that when any volume of new business comes out, this price will be found minimum.

Ask 2.80c for Blue Annealed

Philadelphia, Dec. 23.—Blue annealed sheets are the firmest in the market. A price of 2.70c, Pittsburgh, is minimum, and 2.80c is beginning to appear. Black sheets are unchanged at 3.50c to 3.60c, Pittsburgh. Galvanized sheets are 4.60c to 4.70c.

Production at Buffalo Increased

Buffalo, Dec. 23.—Sheet production in the Buffalo district has been increased to approximately 85 per cent of capacity. This is the largest rate in many months. Inquiry for the first quarter is broadening and placements are substantial. Quotations of 3.50c to 3.60c, mill base, have been made recently, for black sheets. Galvanized sheets are quoted 4.75c, mill.

Galvanized Prices Stronger

Pittsburgh, Dec. 23.—No let-up is apparent in the demand for all grades of sheets and the week just closed brought out additional business. While a large tonnage of galvanized sheets for December delivery recently was booked at 4.60c, the majority of producers now have a better backlog and on tonnage for shipment during the first quarter are asking 4.75c. The high cost of spelter also has exerted an influence in the firmness of the galvanized price. Blue annealed bookings also have been heavy and few producers now are willing to consider tonnage of this grade below 2.70c. Specifications on blue annealed sheets for all-steel box cars are heavy and large tonnages are entered for delivery during the first quarter. Black sheets are the only grade where occasional price concessions under 3.60c appear available in the prompt market. Some mills, however, still are in need of tonnage for balancing rolling schedules and in this connection 3.50c still is available. The majority of the mills, however, are quoting 3.60c for black on first quarter shipments. Operations of the leading maker are at 85 per cent of capacity.

Prices Likely to Keep Step

Chicago, Dec. 23.—The situation in blue annealed sheets appears strong enough to warrant individual action but it now seems probable that whatever advance is in store will apply to all three grades when it does come. Bookings of black and galvanized sheets are fair but still leave some first quarter capacity available. Makers point to a spelter price of $7.55 as likely to compel some action in meeting increasing costs. Western delivered prices figure back to 2.80c, base Gary and Indiana Harbor, for blue annealed 3.70c for black and 4.85c for galvanized.

Large Sales

Of Ferromanganese Are Made Before Advance to $110 Tidewater

FERROALLOY PRICES, PAGE 1677

New York, Dec. 23.—About 10,000 tons of ferromanganese was sold at $105, duty paid, tidewater, prior to the advance of $110 tidewater the past week. This price now is the firm minimum of English and domestic makers. The German syndicate also is quoting this figure. Some business for second quarter delivery was included in the past week's sales but most of the tonnage placed was for first quarter.

More than 2000 tons of spiegeleisen has been sold the past week at $31 to $33, furnace, for 20 per cent.

American scheelite producers have advanced their quotation to $9.50 a short ton unit, following sale of all prospective output of present producing capacity through December, 1925. Ordinary Chinese wolframite is quoted $9 a short ton unit, with sales reported. Ferrotungsten prices range from 82 cents quoted on resale lots to 90 cents asked by domestic converters. Other alloys and ores are unchanged, as published.

Higher Prices Are Named

Pittsburgh, Dec. 23.—Foreign producers of ferromanganese late last week increased the price of this material to $110, Baltimore, or $114.79 delivered Pittsburgh. Sellers in this district are of the opinion that a price of $115 is not far distant. Domestic producers also are quoting this material on the same basis.

Contracts for spiegeleisen for first quarter delivery and in some cases covering first half requirements are fairly numerous and an advance in price is anticipated. Material of 19 to 21 per cent content is now quoted from $32 to $34, depending upon the quantity involved. Contracts being executed carry $30 to $32 for the most part.

Shape Awards Rebound

Slump of Last Week Temporary as Year End Contracts Pour In—Pittsburgh Bridges Take 18,000 Tons—Chicago Fabricators Figure 75,000 Tons

STRUCTURAL SHAPE PRICES, PAGE 1677

New York, Dec. 23.—Inquiry for structural steel is coming out in better volume than many in the trade have anticipated. Prospects for substantial buying before the close of the year are regarded as excellent, particularly in view of the possibility of another advance after Jan. 1. Since election time prices have advanced possibly 10 per cent in this territory. The shape market may be regarded at the equivalent of 2.00c to 2.10c, Pittsburgh, although shading under the minimum still is possible on some tonnage. Orders the past week were numerous but did not aggregate a large tonnage.

Heavy tonnage probably will be required shortly for subway work. An appropriation of $20,000,000, just has been made for two extensions. Bids are to be asked soon on these units.

Inquiry Still Flows In

Boston, Dec. 23.—The structural steel market at Boston is booming despite the fact that recent awards have been relatively light. New work which has come out for figures during the past week totals 7000 or 8000 tons. Fabricators are hurrying to cover for shapes and plates at the present levels as they have been advised by several eastern mills that prices will advance definitely from 10 to 20 cents a 100 pounds Jan. 1. Bids are in for 7800 tons for the new Statler hotel. Other large work which is pending includes 1300 tons for the Spofford apartments, Boston, 1000 tons for a theatre at New Haven, Conn., and 500 tons for a bank building in Boston.

Say Higher Prices Are Necessary

Philadelphia Dec. 23.—Large eastern shape makers are running double turn although not to entire capacity. Smaller mills are at a somewhat lower rate. Asking prices on shapes range from 2.00c to 2.25c, base Pittsburgh, but it is difficult to quote the market due to a lack of business to test prices, makers point out that the increased cost of pig iron due to higher coke wages and higher prices of scrap make higher shape prices necessary.

Bridge Awards Total 18,000 Tons

Pittsburgh, Dec. 23.—Contracts for approximately 18,000 tons of structural material for the Sixth, Seventh and Ninth street bridges here, were closed yesterday with the American Bridge Co. Other structural lettings include 225 tons for the Bovaird-Seyfang Mfg. Co., Bradford, Pa., and 400 tons for the New York-Pennsylvania Co., Lock Haven, Pa., to the Jones & Laughlin Steel Corp. Tonnage of structural material under bid includes 4000 tons for the addition to the William Penn hotel, and about 1300 tons for a building to be erected by the Smithfield St. & Sixth Ave. Land Co. While orders of a few weeks ago for shapes in large quantities were booked at a 2.00c minimum, this figure now has disappeared and the majority of producers are asking 2.10c. Some fabricating shops still are in need of business and are competing keenly for current jobs.

Awards Small; Inquiries Heavy

Cleveland, Dec. 23.—Awards of structural shapes in this district were confined to small tonnages during the past week. Several attractive tonnages are being figured but several of these are not openly in the market. Plenty of business is in the air but little has been put on paper in the past week or ten days. Several good inquiries for plain material have come out, one for 3000 to 4000 tons for export to Argentina, and another of 5000 tons for an engineering project outside this territory. Plain material prices are firm at 2.29c, Cleveland or 2.10c Pittsburgh, with little to test the strength of the market. Fabricated prices are firmer despite a scarcity of present awards. Mill deliveries are becoming more deferred,and from four to six weeks now is quoted on mixed sizes.

Railroad Work Pending

Cincinnati, Dec. 23.—Featuring the local structural market is the inquiry from the Louisville & Nashville railroad for 1200 tons for bridgework in Kentucky, on which bids will close Dec. 27. The Ingalls Iron Works, was awarded the 400 tons for the addition to the Tutwiler hotel at Birmingham, Ala. The new plant of the Wabash Portland Cement Co. at Osborn, O., will be ready for figuring before the end of this year. The Stacey Mfg. Co., reports that it is figuring on a number of inquiries involving gas holders. The plain material price continues to range from 2.00c to 2.10c Pittsburgh base.

Prospective Business Larger

Chicago, Dec. 23.—Inquiries for structural steel, especially from the Pacific Coast, have taken a decided spurt. From San Francisco comes word that the Carquinez Straits bridge, requiring 17,000 tons, is destined definitely to go ahead soon. A 7000-ton hotel at Detroit has entered the prospective list. An office building at Louisville will require 3000 tons, while 4000 tons are involved in a bank and a club building at Oakland, Calif. A 15-story addition to the Chicago Union station, for which Graham, Anderson, Probst & White, 80 East Jackson street, Chicago, are architects, is under consideration. The same architects have been retained to draw plans for an Agricultural Foundation building in Chicago, which may require 15,000 to 20,000 tons of steel, and for a warehouse for Hibbard, Spencer, Bartlett & Co., Chicago. Actual awards have not been heavy but this is a seasonal condition. The quotation on plain material in Chicago is 2.20c, Chicago.

STRUCTURAL CONTRACTS PLACED

Building awards this week..... 54,795 tons
Building awards last week ..... 8,638 tons
Building awards two weeks ago.... 29,988 tons

18,000 tons, Sixth, Seventh and Ninth street bridges, Pittsburgh, to the American Bridge Co.

10,000 tons, Columbia-Presbyterian hospital and medical school, New York, to American Bridge Co., erection to Post & McCord.

9000 tons, loft for Robert M. Katz and Dwight P. Robinson, Inc., New York, 30-50 Madison avenue, New York, to Levering & Garrigues Co.

2500 tons, building at Thirty-fifth street and Seventh avenue, New York, to Harris Structural Steel Co.

1525 tons, Pacific National bank, Los Angeles, to Union Iron Works.

1000 tons for 12-story building, Sixth and Alder streets, Portland, Oreg., to Poole & McGonigle; A. E. Doyle, architect, Worcester building.

1000 tons, Mayer loft, 231 West Twenty-ninth street, New York, reported placed.

1000 tons, approach to the Philadelphia-Camden bridge, Philadelphia, to Bethlehem Steel Co. O'Neill Construction Co. general contractor.

900 tons, Bamberger service station, Newark, N. J.; previously reported placed, went to Shoemaker Bridge Co.

800 tons, garage, 509 West Thirty-fourth street, New York, to unnamed fabricator; T. J. Bird, 103 Park avenue, engineer.

800 tons, Bing & Bing apartment, West End avenue, New York, noted in a recent issue as placed, went to the American Bridge Co.

800 tons, apartment at 10 East Ninety-seventh street, New York, to Paterson Bridge Co.

750 tons, Cataba station, North Carolina, to the Newport News Shipbuilding & Drydock Co.

500 tons, station for the New York Edison Co. in West Thirty-sixth street, New York, to unnamed fabricator; the Kenwell Contracting Co. is general contractor.

500 tons, transmission towers for the Norfolk & Western railroad, to the Blaw-Knox Co.

500 tons, apartment at Ninety-fourth street and West End avenue, New York, to Easton Structural Steel Co.

500 tons, apartment at Ninety-fourth street, New York, to A. E. Norton, Inc.

500 tons, Y. M. C. A. Flushing, L. I., N. Y., to Harris Structural Steel Co.

410 tons, Omaha branch of Kansas City federal reserve bank, to the Omaha Structural Steel Co.

400 tons, Tutweiler hotel, Birmingham, Ala., to Ingalls Iron Works.

400 tons, building for the New York-Pennsylvania Co., Lock Haven, Pa., to the Jones & Laughlin Steel Corp.

400 tons, two bridges for the Pennsylvania railroad, one at Ft. Wayne, Ind., and the other at Martinsville, Ill., to the Bethlehem Steel Corp.

400 tons, telephone exchange, Freeport, L. I., N. Y.; to Hedden Iron Construction Co.

380 tons, power house for the Narragansett Electric Light Co., Providence, R. I., to New England Structural Co.

350 tons, addition to the Hellgate station of the New York Edison Co., New York, to the American Bridge Co.

350 tons, office building at Long Island City, N. Y., to George A. Just Co.

324 tons, store and loft building for Mrs. Elizabeth Martz at Los Angeles, to Llewellyn Iron Works.

260 tons, Pennsylvania railroad bridge in Indiana, to the American Bridge Co.

250 tons, bridge for the Southern railway in Virginia, to the American Bridge Co.

250 tons, bridge for the Central of New Jersey, Perth Amboy, N. J., to the McClintic-Marshall Co.

250 tons, Hubbard Steel Foundry Co. addition, South Chicago, to Worden-Allen Co.

225 tons, building for the Bovaird-Seyfang Mfg. Co., Bradford, Pa., to the Jones & Laughlin Steel Corp.

220 tons, lodge building, Concord, N. H., to the New England Structural Co.

214 tons, section 3 of tractor runway system for Swift & Co., Chicago, to the Vanderkloot Steel Works.

200 tons, gymnasium for Iowa State Teachers' college, Cedar Falls, Iowa, by Bracker Construction Co., Minneapolis, to the American Bridge Co.

150 tons, for craneway, Rubberoid Co., Joilet, Ill., to Worden-Allen Co.

140 tons, machine shop for Hubbard Steel Foundry Co., East Chicago, Ind., to Worden-Allen Co.

122 tons, Y. M. C. A. building, Charlestown, Mass., to New England Structural Co.

Tonnage unstated, possibly 500, three additional stories to Eitel building, Chicago, recently awarded Morava works of McClintic-Marshall Co.

STRUCTURAL CONTRACTS PENDING

8000 tons, Statler hotel, Boston; inquiry revived.

4000 tons, addition to the William Penn hotel, Pittsburgh; bids being taken.

3000 tons, Stark building, Louisville, Ky.; pending.
2300 tons, 245-foot three-span bridge on Seattle-Tacoma highway, Wash.; detailed plans not yet ready.
2000 tons, Elks' club, Oakland, Cal.; pending.
2000 tons, Central National bank, Oakland, Cal.; pending.
1800 tons, of which 1400 tons is for school No. 105, Brooklyn, and 400 tons, school No. 81, Bronx, New York; bids on former close Jan. 6 and on later Dec. 24; these schools were noted in a previous issue as involving 1400 tons in the aggregate.
1300 tons, Spofford apartment building, Boston; bids in.
1300 tons, building to be erected by the Smithfield Street & Sixth Avenue Land Co., Pittsburgh; contract still pending.
1200 tons, bridgework for Louisville & Nashville railroad in Kentucky; bids in Dec. 27.
1200 tons, Columbia university dormitory, New York; plans out soon.
1200 tons, bank, Utica, N. Y.; bids asked.
1200 tons, New York academy of medicine, New York; bids asked.
1100 tons, loft at 491 Seventh avenue, New York; pending.
1100 tons, motor bus terminal, Indianapolis; pending.
1000 tons, warehouse and pier, San Francisco; pending.
1000 tons, Army and Navy Y. M. C. A. building, San Francisco; pending.
900 tons, hospital, Manhattan and 123rd street, New York; pending; G. Richard Davis, architect.
800 tons, Toledo Edison Co. addition, Toledo, O.; bids asked.
700 tons, apartment for Dwight P Robinson Co., New York; pending.
700 tons, Ambassador hotel, Hammond, Ind.; pending.
600 tons, high school in Philadelphia; general contract awarded to Cramp & Co.
500 tons, apartment building, Commonwealth avenue, Boston; bids in.
500 tons, terminal warehouse, Brookline avenue, Boston; bids in.
450 tons, school 116, Manhattan, New York; inquiry to be revived.
450 tons, apartment building, 390 Beacon street, Boston; bids in.
422 tons, building for the Union Institute for Savings, Boston; bids in.
400 tons, Scranton Times building, Scranton, Pa., bids asked.
400 tons, Lackawanna railroad repair shops, Buffalo; pending.
400 tons, theater, Elmira, N. Y.; pending.
400 tons, Dorchester tunnel extension, Boston; bids in.
400 tons, office building for Public Service Corp. of New Jersey, Englewood and Jersey City, N. J.; pending.
400 tons, telphone building, Tratman avenue, New York; pending.
400 tons, apartment at 121 West Seventy-fourth street, New York; pending. George Gagge, 299 Madison avenue, New York, is architect.
300 tons, boiler house for the Public Service Corp., Harrison, N. J., pending.
300 tons, bridge for the Reading Co.; bids close Dec. 26.
300 tons, garage, Boston; bids being taken.
250 tons, apartment building, Waterbury, Conn.; bids in.
250 tons, school house, Newton, Mass.; bids being taken.
154 tons, road work in Randolph county, Mo.; general contract awarded W. H. Shone Co., Freeport, Ill.
120 tons, five passenger stations for the Baltimore & Ohio railroad, on Staten Island, New York; bids asked.
100 tons, store at Elizabeth, N. J.; Wilhelm & Sons, that city, general contractors.
100 tons, King county bridge, at Auburn, Wash.; bids in.
Tonnage unstated, 34-story addition to Roanoke building, Chicago, plans now out from Holabird & Roche, 104 South Michigan avenue, Chicago.

Stone Association Elects

S. A. Reese, of Evansville, Ind., recently was elected president of the Southern Association of Stove Manufacturers; B. H. Hartsfield, Birmingham, Ala., vice president; W. H. Cloud, Louisville, secretary and A. P. Selman, Rome, Ga., treasurer. The next convention will be held in Jacksonville, Fla.

Warren I. Lee has been appointed receiver of the Oldham New York Saw Works, foot of Twenty-sixth street, Brooklyn, N. Y.

Car Orders Still Coming

Louisville & Nashville Closes on 2000—Several Large Orders Expected—Track Accessory Buying Good

RAILROAD TRACK MATERIAL PRICES, PAGE 1677

Chicago, Dec. 23.—The Soo Line and the Pere Marquette each has placed about 10,000 tons of rails, with track fastenings in proportion. In each case the Illinois, Inland and Bethlehem companies participated, with Illinois getting about half of the total. The Soo Line tonnage included rails for the Duluth, South Shore & Atlantic railroad. The Southern Pacific has placed 32,500 tons of rails with the Tennessee company instead of 22,500 as announced last week and 22,500 tons with the Colorado company. The Southern Pacific track fastening business aggregated about 11,000 tons. The leading maker of track fastenings last week booked a total of 11,000 kegs of spikes and bolts and 26,000 tons of tie plates.

Freight car builders last week placed considerable steel as a result of recent awards. New inquiry includes plans for 3000 cars from the Baltimore & Ohio railroad and 525 for the Ford Motor Co. The Louisville & Nashville has placed 2000 gondolas and 22 passenger cars. Prospective rail and car business from western roads is large and after the turn of the year this is expected to be placed.

Price Rise May Force Buying

New York, Dec. 23.—Following substantial buying last week, the car market momentarily at least is quiet. The upward trend of the raw materials market is likely to force further good buying before the close of the year. Locomotive buying is featured by an order for 30 engines for the Reading Co., this business going to the Baldwin Locomotive Works. The Central of New Jersey has closed on 10 locomotives, this order also going to the Baldwin Locomotive Works. The New York Central purchased nine electric locomotives from the General Electric Co., and 10 tenders from the Lima Locomotive Works. New inquiry includes nine locomotives for Guggenheim Bros., 120 Broadway, New York.

Henry Ford's railway, the Detroit, Toledo & Ironton system, has placed an order for 3000 tons of steel rails with a Belgian mill. This is the first instance in recent years where an American railway company has gone out of the country for its rails.

Fully 10,000 cars are expected to be placed before Jan. 1. The Missouri Pacific is expected to close on 1000, Northern Pacific on 1000 and Burlington on 2500. The Baltimore & Ohio is inquiring for 3000 and is expected to award substantially more.

Award 2000 Cars

Philadelphia, Dec. 23.—Featuring the demand for railroad equipment in this district is the award of 25 locomotives by the Louisville & Nashville railroad to the American Locomotive Co., 2000 gondolas and 12 baggage cars to the Pressed Steel Car Co., and eight baggage and two dining cars to the American Car & Foundry Co.

Rail Mills Heavily Scheduled

Pittsburgh, Dec. 23.—Rail mills in this district are scheduled heavily at present owing to an attractive volume of specifications having been received from various railroads for standard sections for shipment early in 1925. The market on light rails still is comparatively inactive. From 1.80c to 1.90c still is quoted although some mills will not name below 1.85c or 1.90c. Coal mine operations have shown little sign of betterment and this is tending to restrict the buying of light rails. Rail steel light rails are quoted at 1.65c to 1.75c generally, although one or two makers insist upon the same minimum of 1.80c as makers of billet-rolled rails.

Railroad spikes were advanced $2 per ton, as noted a week ago, going from 2.80c to 2.90c which now is the quotable market, this being a firm minimum. Not many new orders have been taken at the new level, but specifications on contract at lower figures are heavy. Makers are operating 80 per cent or better. Small spikes advanced from 3.10c to 3.20c; one important maker, however, still quotes 3.00c. Boat and barge spikes remain quotable at 3.25c, while track bolts are available from 3.75c to 4.00c. Tie plates command from $47 to $50 per ton, according to specifications and quantity or 2.35c and 2.50c f.o.b. Pittsburgh.

CAR ORDERS PLACED

Baltimore & Ohio, five dining cars, to the Pullman Car & Mfg. Corp.
Central of Georgia, six passenger cars, to the Pullman Car & Mfg. Corp.
Central of New Jersey, 23 passenger coaches to the Standard Steel Car Co. and seven combination coaches, to the Bethlehem Shipbuilding Corp.
Louisville & Nashville railroad, 2022 cars, 2000 gondolas and 12 baggage and mail cars to the Pressed Steel Car Co. and 8 coaches and 2 diners to the American Car & Foundry Co.
New York Central, conversion of 200 box cars to stock cars and 200 box cars to flat cars, to the Illinois Car & Mfg. Co.
Northern Pacific, 800 gondolas, to the Ryan Car Co.
Southern railway, seven baggage cars, to the Pullman Car & Mfg. Corp.
United States Food Products Line Corp., 50 tank cars, to the American Car & Foundry Co.
Wabsh, 400 gondloa bodies, to Streator Car Corp.
Waite Phillips Co., 50 tank cars, to the General American Tank Car Corp.

CAR ORDERS PENDING

Baltimore & Ohio, 1000 70-ton gondolas, 1000 50-ton box car bodies and 1000 50-ton steel underframe flat car bodies; pending.
Guggenheim Bros., 120 Broadway, New York, 175 miscellaneous cars for export; bids asked.
Mississippi Central, 100 flat cars, pending.

Philadelphia Imports Up

Philadelphia, Dec. 23.—Imports at this port during the week ending Dec. 27, included 5807 tons of iron ore from Algeria and 1086 tons from Germany; 503 tons of pig iron from British India; 531 tons of ferromanganese from England; 155 tons of structural shapes from Belgium and 20 tons of steel scrap from England.

Arthur J. Stein has been appointed receiver of the Nurim Bed Spring Co., Inc., 71 New Jersey avenue, Brooklyn, N. Y., manufacturing bed springs.

Distillate Demand

Coming Out In Good Volume—By-Products Output Increasing

New York, Dec. 23.—Although production has further improved, prices on coal by-products are unchanged. Industrial demand for distillates is coming out in good volume, and in some lines where current buying is not so large there is a substantial backlog of contract business, some of which was taken sometime ago on an increasing scale basis, in anticipation of a greater output later.

Pure benzol is quoted at 25 cents works in tanks and 30 cents in drums 90 per cent, 23 cents in tanks and 28 cents in drums; toluol, 26 cents in tanks and 31 cents in drums; solvent naphtha, 25 cents in tanks and 30 cents in drums; and commercial xylol, 26 cents in tanks and 31 cents in drums.

Spring contracting in naphthalene continues around 5½ cents works for flakes and 6½ cents for balls. Spot trading is rather light. Phenol is steady at 27 cents local warehouse for spot shipment and 25 cents works for futures.

Dullness dominates spot trading in sulphate of ammonia. The market is supported largely by long term contracts placed sometime ago. Prices on material for domestic account are quoted at $2.65 to $2.70 works. Export demand is featureless with prices purely nominal.

Coke Oven By-Products

Spot*	
Per Gallon at Producers' Plants in Tank Lots	
Pure benzol	$0.25
Toluol	0.26
Solvent naphtha	0.25
Commercial xylol	0.26
Per Pound at Producers' Plants	
Phenol	0.27
Naphthalene flakes	0.05⅝ to 0.06
Naphthalene balls	0.06½ to 0.07
Per 100 Pounds at Producers' Plants	
Sulphate of ammonia	$2.65 to 2.70
Contract	
Pure benzol	Nominal
Toluol	Nominal
Solvent naphtha	Nominal
Commercial xylol	Nominal
Per Pound at Producers' Plants	
Phenol	$0.25
Naphthalene flakes	0.05½ to 0.06
Naphthalene balls	0.06½ to 0.07

*Spot distillates are subject to shading.

Scrap Holds Upward Trend

(*Concluded from Page* 1678)

posed to negotiate for new tonnage. Furthermore one Cleveland steelmaker continues the embargo imposed two weeks ago while the other is regulating shipments to prevent overstocking. Prices are unchanged but firm.

Outside Sources Strengthen Market

Cincinnati, Dec. 23.—With outside consumers bidding for Cincinnati holdings of iron and steel scrap there has been a strengthening change in the market. This is true particularly of the cast grades for which there is a fair demand. As a result of the outside activity, local dealers have marked up their lists another 50 cents a ton. Buying on the part of consumers in this district is at low ebb and not much change in existing conditions is anticipated until after the new year and inventories have been completed. Several users have indicated that they will be in a position to take on additional tonnages after Jan. 10.

It is understood that figures comparatively high with present market quotations were obtained by the Big Four and other railroads in their lists closed recently. Details are not available, but successful bids were considerably higher then last month's offers.

St. Louis Market Strong

St. Louis, Dec. 23.—Iron and steel scrap continue strong, with enthusiasm among dealers and sympathetic action with Chicago and points further East. As usual at this time of year, consumers are taking only current needs and many mills and foundries are well supplied, some having enough for three months. An additional deterrent to purchasing is the fact that while order books are fairly well filled, prices are not such as to show profits.

Scrap continued to arrive in large quantity until checked by the blizzard Dec. 18. Since then railroads have had difficulty, the entire region being snow bound. Large inquiries have come from Chicago and elsewhere, and have had the effect of holding prices strong. Not much scrap has moved out, however, price differentials not being sufficiently broad to permit shipments.

Steelmakers apparently are willing to buy scrap, but only at their own prices. Some distress cars have been bought during the past few days. There is good demand for material for blast furnaces, but rolling mill grades are relatively quiet. Cast scrap is higher.

The following railroad offerings were reported: Cotton Belt, 1500 tons; Wabash, 5000 tons; Kansas City Southern, 350 tons; Mobile & Ohio, 450 tons; Missouri Pacific, 500 tons and Chicago Belt Lines 450 tons.

Market Strong; Prices Advance

Birmingham, Ala., Dec. 22.—Better demand contracts in sight, quotations up $1 per ton and prospects bright for continued activity represent the summary for the iron and steel scrap market this week. Dealers are feeling much better since they are making sales for immediate delivery and and have inquiries for future needs. Heavy melting steel is needed in greater quantities while other grades are showing life. With one or two exceptions an advance in price is noted.

Weirton Mill To Resume

Pittsburgh, Dec. 23.—Operations at the Steubenville tin plate division of the Weirton Steel Co. will be resumed Jan. 5 after having been idle since last May. During the course of the next few months this plant, consisting of 12 hot mills, will be completely electrified. The power will be supplied from the company's main works at Weirton, W. Va., and plans now are being formulated to erect a power line connecting the two plants.

Vanadium Corp. Acquires U. S. Ferroalloy Co.

New York, Dec. 23.—A. A. Corey, president of the Vanadium Corp. of America, annuonces the acquisition of the United States Ferroalloy Co. and consolidation of the two companies. Sales and operating organizations of the United States Ferroalloy Co. will be retained. The Vanadium Corp. by its new acquisition, becomes a rounded out ferroalloy producing company, in a position to supply not only its regular product, ferrovanadium, but also is able to supply ferrosilicon, ferrochrome, ferrotungsten, tungsten powder, ferromolybdenum and other specialties. It has been equipped to supply tungsten and molybdenum heretofore, the United States Ferroalloy Co. bringing in facilities for producing alloys of chrome and silicon.

Frog and Switch Maker Buys Competing Plants

St. Louis, Dec. 22.—Announcement has been made by W. H. Elliot, president of the Elliot Frog & Switch Co., that the Ramapo Ajax Corp. has taken over the East St. Louis and Pueblo, Colo., works of the Elliot Frog & Switch Co. and will be in full charge on Jan. 1. Details of the terms of the merger were not made public, but it is understood that present stockholders of the Elliot Co. will retain a material interest in the combination.

The Ramapo Ajax Corp. is a subsidiary of the American Brake Shoe & Foundry Co. and has plants at Hillburn, N. Y., Niagara Falls, Canada and New York; Chicago, and Superior, Wis. Its headquarters are in New York. It is understood that the newly acquired plants will be operated as heretofore.

Mr. Elliot, who has been with the Elliot Frog & Switch Co. for 42 years, has been elected a director and vice president of the Ramapo corporation. Dickson Fairback and W. J. Fairback, vice presidents of the Elliot company, were made vice presidents of the Ramapo corporation, and will have headquarters in East St. Louis and Pueblo, respectively.

J. B. Strong, president of the Ramapo Ajax Corp. said that the merger was planned to align plants in different parts of the country in order to give prompt and efficient service. The strategic location of plants will enable the corporation to work out problems of distribution arising with abandonment of the Pittsburgh plus basis.

Order 25 Patrol Boats

Washington, Dec. 23.—The United States coast guard has awarded twenty-five 75-foot patrol boats to be used in running down illicit liquor shippers off the coasts. The awards are as follows: Mathis Yacht Bldg. Co., Camden, N. J., 15 boats, $18,675 for each boat; Gibbs Gas Engine Co., of Florida Jacksonville, Fla., 10 boats, $19,445 each. Twenty concerns submitted bids. The bids of seven were rejected because of not having been made in accordance with proposed forms.

Nonferrous Metal Markets

Prices of the Week

	Copper—Electro delivered	Copper—Lake delivered	Copper—Casting refinery	Spot Tin, N. Y. Straits	Spot New York Lead	Lead St. Louis East	St. Louis Zinc	Aluminum 98-99%	Antimony Spot	Nickel Ingot
Dec. 17	14.62½	14.75	14.00	55.62½	10.00	9.65	7.45	27.00	14.00	29.00
Dec. 18	14.62½	14.75	14.00	55.50	10.00	9.65	7.42½	27.00	14.00	29.00
Dec. 19	14.62½	14.75	14.12½	56.25	10.00	9.75	7.47½	27.00	14.25	29.00
Dec. 22	14.75	14.87½	14.25	57.25	10.12½	9.87½	7.60	27.00	14.50	29.00
Dec. 23	14.87½	15.00	14.30	57.75	10.12½	9.87½	7.62½	27.00	14.50	29.00

NEW YORK, Dec. 23.—Further advances have taken place in principal nonferrous metals to new high levels for 1925. London has led the advances here, reflecting the growing industrial activity in Europe and the increasing European drafts upon the world's metal supplies. American consumers have been stimulated by the advances abroad into covering forward requirements in a large way and a considerable tonnage of domestic business has been closed in the past week.

Copper—Electrolytic copper advanced ¼ cent this week to 14.87½c, delivered Connecticut, 15c Middle West. Sales were good on the basis of 14.75c Connecticut. The foreign market advanced to 15.00c c.i.f. foreign part and dealers resumed active bidding in the f.a.s. market.

Copper wire—Reflecting the advance in copper prices and the accordingly sharp expansion in demand from public utility companies and electrical equipment makers, wire prices have strengthened. Bare copper wire has been selling in the open market at 16.37½c, base mill; inside price for large quantities to large buyers, to 16.62½c mill, but today prices are ⅛ cent higher. Weatherproof wire is selling at 18.50c to 18.75c.

Rolled products—The American Brass Co. advanced its published base for rolled products ¼ cent Dec. 22 bringing products to a 15c copper base. This rise somewhat anticipated the advance in copper, but is a reflection of the excellent demand for rolled products which has appeared on the renewed rise in copper.

Zinc—The zinc market resumed its rise this week, reaching new high levels for the year. Prime western sold at 7.60c, East St. Louis, for prompt and first quarter shipment, Dec. 22. Brass special premium has increased to 10 points, due to excellent demand for zinc from the rolling mills. Price of high grade zinc has increased to 8.50c, delivered. Foreign demand for zinc has revived on a large scale, following the recent arbitrage transactions whereby London dealers bought futures in London and resold them in New York. However, Europe needs the zinc and with the resale of contracts for future shipment from this country it again became necessary for London to buy here.

Lead—Lead has reached levels in the open market in this country which are just about as attractive as foreign bid prices for the class of lead that is treated in bond in this country from ores originating in Mexico. In other words, the New York open market price has reached 10.12½c to 10.25c, whereas Germany has been paying 8.60c. It is more profitable for the sellers to realize 10.12½c, New York, than 8.60c c.i.f. foreign port. The American Smelting & Refining Co. advanced its lead price twice in a week, making it now 9.50c, New York, which is fully ½ cent below the open market. The principal western seller has been alloting a couple of cars daily at 9.10c, East St. Louis, whereas open market sellers have been getting 9.87½c, East St. Louis.

Tin—The tin market has reached new high levels on account of the steady rise in import costs, due to advancing London prices. Spot and future Straits reached 57.75c today. The feature of the market has been the heavy sales of Straits at Singapore, these sales being absorbed without difficulty, indicating the metal has been passing into strong hands. The premium over 99 per cent remains at ¾ cent.

Antimony prices have shown a rising tendency.

Aluminum is strong, with quotations unchanged.

Metals and Products Continue Up With London Leading in Advance

Mill Products

Base prices cents per pound, f.o.b. mill

SHEETS	
Copper, hot rolled	22.37½
High brass	19.12½
Zinc, ga. 9 to 18 (plates ½c less)	10.75
Lead, full sheets (cut ¼c more)	13.25
Aluminum, bright, 0 to 35 gage	37.50 to 92.00
SEAMLESS TUBES	
High brass	27.75
Copper	24.75
RODS	
High brass, round, ⅜ to 2½-inch	17.12½
Naval brass	19.62½
WIRE	
Copper	16.50 to 16.87½
High brass	19.62½

Old Metals

Dealers' buying prices cents per pound

HEAVY RED BRASS	
New York	8.75 to 9.00
Chicago	9.75
Cleveland	10.00
HEAVY YELLOW BRASS	
New York	7.00 to 7.25
Chicago	8.00 to 8.25
Cleveland	8.25
ZINC	
New York	4.25 to 4.50
Chicago, dross	5.00
Cleveland	4.25
HEAVY COPPER AND WIRE	
New York	11.75 to 12.25
Chicago	11.50 to 12.00
Cleveland	12.75
RED BRASS TURNINGS	
New York	8.00 to 8.25
Chicago	9.25
Cleveland	9.25
YELLOW BRASS TUBING	
Cleveland	8.50
NO. 1 BRASS ROD TURNINGS	
New York	8.00
Chicago	8.25
Cleveland	8.50
LIGHT COPPER	
New York	9.75 to 10.00
Chicago	10.50
Cleveland	10.50
LIGHT BRASS	
Chicago	7.25
Clippings, Chicago	9.75
ALUMINUM	
Borings, Cleveland	12.50
Old sheet, Cleveland	18.00
Clippings, Cleveland	22.00

Secondary Metals

Remelt aluminum No. 12	22.00 to 22.50
Brass ingot 85-5-5-5	12.50 to 13.00

Fewer Brick Made

Production of Refractories in November Less Than October

Production of fire clay brick during November by members reporting to the Refractories Manufactures association totaled 33,593,564 brick, or 66 per cent of capacity reporting. This compares with 38,261,078 produced during the preceding month. Production of silica brick least month amounted to 3,723,870, or 46 per cent of capacity reporting, Consignments of fire clay for October totaled 35,679,837, which compared with 31,371,815 brick shipped during November. Net new business in fire clay brick booked last month was 36,136,479, as compared with 33,764,853 during October. Detailed figures follow:

FIRE CLAY BRICK

	November 1924	October 1924
Capacity reporting	50,973,967	51,948,967
On hand last day preceding month	149,985,426	149,586,979
Production	33,593,564	38,261,078
Shipments	31,371,815	35,679,837
On hand last day current month	152,207,175	152,168,220
New orders received during month	36,136,479	33,764,853
Cancellations	2,519,995	353,30u
Net new business	33,616,484	33,411,553
Unfilled orders last day current month	37,969,168	36,724,960

SILICA BRICK

	November 1924	October 1924
Capacity reporting	8,019,667	8,019,667
On hand last day preceding month	10,027,046	10,975,715
Production	3,723,870	3,237,936
Shipments	3,474,347	4,186,605
On hand last day current month	10,276,569	10,027,046
New orders received during month	5,636,232	4,055,753
Cancellations	51,020	19,578
Net new business	5,585,212	4,036,175
Unfilled orders last day current month	5,242,745	3,131,880

Erie Paid Too Much for Locomotive Repairs

Washington, Dec. 22.—Cost of repairs to locomotives and cars of the Erie railroad at outside shops during 1920, 1921, 1922 and 1923 was greatly in excess of the cost of similar work in the railroad company's own shops and a large part of these costs was an unreasonable expenditure for maintenance of equipment, and not in the interest of efficient and economical management as required by section 15a of the Transportation act, according to a report of the interstate commerce commission following investigation and hearings of repair costs on equipment of roads. Closing down of the railroad company's shops in the business depression also was criticized.

The commission found the total paid for classified repairs on 106 locomotives was $3,157,500, including $199,000 for the cancellation of two contracts. Cost of repairing 92 of these locomotives in outside shops was compared with the cost of similar repairs in the Erie shops in the same period. It was found the total cost for repairs to the 92 locomotives at outside shops was $2,820,281.60, while substantially similar repairs on the same class of locomotives in the Erie shops cost $642,705.54. The commission concludes the total cost in outside shops was about 438 per cent of the cost of performing the same work in the Erie railroad's own shops.

Outside cost plus contracts were made with the Baldwin Locomotive Works, the American Locomotive Co., the Lima Locomotive Works, the McMyler-Interstate Co., Cleveland; Ferguson Allan Co., Buffalo; Crucible Steel Co., and others.

Witness for the Erie said that resort to outside shops after the period of federal control was necessary because the condition of its locomotives had "progressively deteriorated during federal control."

Completing Sheet Mill

Sarnia, Ont., Dec. 23.—W. B. Boyd, president of the Dominion Alloy Steel Corp., which is erecting a large alloy steel plant south of this city, stated that barring unforeseen obstacles the sheet mill will be turning out finished product early next March, possibly sooner.

Reparation Is Given

Washington, Dec. 23.—Reparation has been awarded by the interstate commerce commission to complainants and interveners, including steel and coal shippers, in the case of the Jones & Laughlin Steel Corp., against the Pittsburgh & Lake Erie and other carriers. The amount of the reparation, which will be ascertained later, will be recovered on shipments of iron and steel articles, coal and ore, from April 1, 1914, to April 14, 1915, on which the complainants and interveners paid the charges of the Monongahela connecting railroad, the South Buffalo railroad and the Union railroad, in addition to the district rates of their trunk lines connections. It is expected the reparation will run into hundreds of thousands of dollars.

Work Begun on New Wire Plant at Sparrows Point

New York, Dec. 23.—Construction of a wire rod and wire plant has been started at the Sparrows Point plant of the Bethlehem Steel Corp., according to an announcement by Eugene G. Grace, president of the company. The plant will produce a full line of wire products including a plain and galvanized wire, wire fencing, nails, etc. It will have a capacity of 120,000 tons annually. Mr. Grace stated the wire plant at Johnstown, which was acquired at the time the Cambria Steel Co. was taken over, did not have the capacity to meet demand. The location at Sparrows Point will afford better service to the eastern wire market as well as permit economical water transportation to the points along the Atlantic seaboard, Pacific coast and foreign ports.

Make New Rates West

Chicago, Dec. 23.—Western carriers are publishing tariffs, effective Jan. 31, revising class rates between Illinois points and the Twin Cities and Duluth. New rates from Indiana points to these destinations based on the Illinois rates, are to be made effective the same day, while rates from Illinois points to Missouri river points are slated to follow. Typical of the changes are the increase from 30½c to 38c per 100 pounds in fifth class from Chicago to St. Paul and from 41c to 59c in fourth class. Suspension of the new rates doubtless will be asked by shippers' organizations.

Coal Contract Opens Mines

Several bituminous coal mines in the Clinton district, near Danville, Ill., which were shut down for some months, have reopened as a result of the placement of contracts by the Illinois Steel Co. Contracts for Kentucky coal are said to have been canceled. The Illinois Steel contract is said to call for 3000 tons daily at the outset.

German Business Better Since August

Washington, Dec. 23.—Improvement in German business since August has continued, but increased production is due largely to a better domestic demand rather than an increase in export orders, according to a cable to the department of commerce from Commercial Attache Herring at Berlin. This improvement is reflected in easier money rates and larger totals in carloadings and savings deposits.

Price reduction efforts, the cable says, thus far have become ineffective and the rise in steel prices with the continuing over-organization of business prevents lowering of production costs. As a result export dumping has been continued.

The revival of purchasing power assures a high domestic price level and indicates an expanding market for American goods, particularly copper, petroleum products, phosphates and leather and rubber shoes.

Unemployment has further decreased to 426,000 recipients of doles on Nov. 15 as against 588,000 in August and 1,439,000 in January. Living costs have remained stationary. Wholesale prices as of Dec. 4, are 141, as compared with 140 for November 13, according to the *Frankfurter Zeitung* index. The unjustified spread between wholesale and retail prices continues.

The revived purchasing power assures a stable currency, a high domestic price level, and prospects of an early abolition of many import prohibitions without simultaneous tariff increases, the cable points out. An expanding market for American goods thereby is indicated.

Engineers Discuss Steel for Railway Use

"Special Steels Used by American Railways" was the subject of an interesting symposium at the December meeting of the New York chapter of the American Society for Steel Treating, held in the Woolworth building, Dec. 17. The program was featured by three 30-minute addresses. Lawford H. Fry, metallurgical engineer of the Standard Steel Works Co., Burnham, Pa., spoke on "Steel for Rolling Stock", particularly locomotives and cars. C. B. Bronson, of the New York Central lines, made an address entitled "Steel for Permanent Way, Particularly Rails and Bridges". James E. Howard, engineer-physicist of the interstate commerce commission, spoke on the "General Requirements of the Railway."

Coast Trade Holds Well

Turn of Year Restricts Activity of Buying but Conditions Are Good—Utah Pig Iron Advanced $1 and Is Supplanting Imported Grades

SEATTLE, Dec. 17.—The iron and steel trade on the North Pacific is marking time. Approach of the holidays and inventory has slowed buying while winter weather has interfered with outside construction. The lumber industry shows improvement although activity will be limited until middle January after the plants have undergone their usual semi-annual overhaul.

Every indication points to satisfactory business conditions next year. Buying is certain to be heavy as many stocks have run low. Optimism prevails in every branch of business, applying particularly to iron and steel. Firmness is indicated in iron and steel prices and advances at Coast centers are likely in the near future.

Construction totals at several Coast cities for the current year are expected to establish new records.

Pig Iron and Coke

Columbia iron has been advanced $1 per ton, the new price being $20 base, furnace. Buyers in this territory have ordered sufficient iron for first quarter to cover their needs so that there will be little activity in iron for some time. European suppliers appear to be more eager to sell their product in this market but demand is restricted and Columbia is apparently supplanting the foreign trades. The last order of continental iron, 500 tons, has just arrived here and been delivered. No more is enroute. There is no change in the coke market.

Bars, Plates and Shapes

While no changes in prices have taken place in the steel bar market, the tone has improved within the last fortnight. Jobbers are interested in merchant bars and have been buying more freely. The mill price at San Francisco for merchant bars has advanced twice in the last two weeks, the present level being 2.60c. The price in northern territory remains 2.50c but the market is strong at that figure and an advance here is not unlikely. No large tonnages are pending for reinforcing material and orders being placed are small. The outlook for early next year is favorable.

The plate market is quiet, no large contracts pending in this district. Wholesalers state there is a fair demand for light plates. The best price quoted this week is 2.50c, representing an advance from 2.40c last week.

In sympathy with other items, shapes are strong having advanced from 2.40c to 2.45c within the week. Poole & McGonigle have been awarded 1000 tons for the 12-story office building at Sixth and Alder streets, Portland. Dec. 20, bids will be opened at Tacoma for the Hylebos bridge, involving 133 tons. Dec. 22, King county will open bids for a bridge at Auburn, involving about 100 tons. The largest steel bridge in the state is planned for 254 feet each and will require about 2300 tons of steel. The detailed plans have not been completed and it will be some time before bids are called. Dec. 29, Tacoma will receive bids for the three story sub-station of the Cushman power project to cost $500,000. Both reinforcing material and structurals will be required but the tonnage has not been made public. Contractors also are awaiting decision in the matter of the Lake Cushman steel towers, 750 tons, bids for which were opened several weeks ago.

Finished Materials Active

Jobbers report business moving in small tonnages. Severe weather hampers buying to some extent. Sheets, light plates and boiler tubing appear to be in best demand at present. Wholesale prices are unchanged but are likely to be advanced in the near future providing the leading jobbers are satisfied a higher schedule can be maintained.

Old Materials Dull

This market is inactive. The main buying interest is well stocked with steel scrap and is not encouraging shippers. The price remains at $8 gross but is not strong. Buying of cast iron scrap is limited, as many foundries are using increased quantities of low grades of pig iron. The average price being paid for cast iron scrap is $18.

Societies News

THE annual meeting of the American Management association will be held at the Hotel Astor, New York, Jan. 28-30, according to an announcement just made. The tentative program for the meeting is as follows:

Wednesday, Jan. 28

10:00 a.m.—Address of president. Sam A. Lewisohn, vice president and treasurer, Miami Copper Co.

10:30 a.m.—"Measuring and Grading the Supervisory Forces," by W. D. Stearns, works department, Westinghouse Electric & Mfg. Co.

11:30 a.m.—Group meetings on measuring and grading supervisory forces in retail organizations, factories, offices, field sales organizations and public utilities.

12:45 p.m.—Luncheon and meeting of board of councillors.

2:15 p.m.—"What Can Business Learn from Modern Army Organization," by Col. Robert I. Rees, assistant vice president, American Telephone & Telegraph Co., and Col. E. Z. Steever, personnel director, General Electric Co.
"A Health Supervision Manual," by Dr. R. S. Quinby, service manager, Hood Rubber Co.

3:30 p.m.—"Applying Incentives to Mutual Benefit Associations," by E. L. Hewitt, industrial relations department, U. S. Rubber Footwear Factories.
"What Should You Run in Employe Magazines?" by D. C. Vandercook, editor, International Textbook Co.

4:45 p.m.—Annual meeting.

8:00 p.m.—"Public Schools and Apprentice Training," by A. B. Gibson, manager, Westinghouse technical night schools.
"Vocational Education," by representatives of National Association of State Directors of Vocational Education.

Thursday, Jan. 29

10:00 a.m.—"Placing and Introducing Employes," by Earl B. Morgan, manager employment and service, Curtis Publishing Co.

10:45 a.m.—"Limitations in the Use of Psychological Tests," by C. S. Yoakum, professor of business administration, University of Michigan.

11:30 a.m.—Group meetings on above topics in retail organizations, factories, offices and field sales organizations.

12:30 p.m.—Company luncheons.

2:15 p.m.—"Selecting and Placing the College Graduate in Business," by John Mills, personnel director, engineering department, Western Electric Co.
"Employe Lunchrooms," by Louise Moore, employes service manager, Dutchess Mfg. Co.

3:00 p.m.—Group meetings on employe lunch rooms for offices, factories and both office and factories.

3:45 p.m.—"Essential Personnel Records," by Bryce Haynes, U. S. Rubber Co.

4:30 p.m.—Group meetings on essential personnel records in the office, factory, retail organization and field sales force.

7:00 p.m.—Annual dinner. "The Mission of Management," by Glenn Frank, editor, *The Century*.

Friday, Jan. 30

10:00 a.m.—"Classroom Training of Employes," by G. B. Thomas, educational director, engineering department, Western Electric Co.

10:45 a.m.—Group meetings on training for salesmen, retail sales forces, office forces, junior executives and factory supervisors, skilled workers and technical men, and unskilled workers.

11:30 a.m.—"Technique of Job Analysis," by H. G. Kenagy, sales research department, Procter & Gamble Co.
"Education of Employes in Economics," by A. J. Beatty, educational director, American Rolling Mill Co.

3:00 p.m.—"Pay Roll Administration," presented by H. M. Jefferson, manager, personnel development department, Federal Reserve Bank of New York.

4:00 p.m.—Group meetings on payroll administration in offices, retail stores, field sales forces, public utilities, building trades and government offices.

* * *

Secretary Hoover Is Honored

President Leguia of Peru and Herbert Hoover, secretary of the department of commerce Washington, have been elected honorary presidents of the Pan American scientific congress is session at Lima, Peru. The elections were by acclamation.

* * *

Secretary Addresses Steel Treaters

W. H. Eisenman, national secretary of the American Society for Steel Treating was the guest of honor at a meeting of the Golden Gate chapter of the society held at San Francisco, Dec. 13. Following a discussion of the affiairs of the society, Mr. Eisenman read a message from the president to the Pacific Coast chapters. A number of entertainment features were presented during the evening.

Convention Calendar

Jan. 15-16—American Society for Steel Treating. Winter sectional meeting, Sinton hotel, Cincinnati. W. H. Eisenman, 4600 Prospect avenue, Cleveland, is secretary.

Jan. 28-30—American Management association. Annual convention at Hotel Astor, New York. Headquarters of the association are at 20 Vesey street, New York.

Feb. 24-27—American Concrete Institute. Annual meeting in Chicago. Harvey Whipple, 1807 Grand boulevard, is secretary.

Britain Blowing in Furnaces

Markets Improved, Additional Sales of Iron Made to United States—English Railroads To Spend £30,000,000 on Improvements—Germans Form Semifinished Syndicate—Increasing Tin Plate Output

Iron Trade Review Staff Cable

European Headquarters,
IRON TRADE REVIEW,
2-3 Caxton House, Westminster, S. W.1

LONDON, Dec. 23.—British pig iron makers are preparing to start additional furnaces, because of improvement in the market. Additional sales have been made to the United States, principally from the Barrow district. It is forecast that British railroads will spend $30,000,000 on improvements, including the cost of 31,000 tons of rails. Demand for tin plate is increasing, especially in the Far East and South America. The tin plate stabilization committee will be continued for another year. The market for galvanized sheets is dull. Some tonnages has been sold by British makers to Japan.

IRON TRADE REVIEW reports from Paris state the French pig iron market is firm. Exports of hematite iron are decreasing. Inland freight rates have been advanced. Brussels reports that the Belgian coal syndicate has been reorganized.

In Germany a new syndicate for the sale of semifinished material has been organized. German reports comment on improvement in the markets. The Germans lost a Japanese rail order to Belgian mills. German tin plate production is showing a rapid increase, enabling the mills to make large exports.

Good Business Faces British Mills for 1925

European Staff Special

Office of IRON TRADE REVIEW,
Prince's Chambers, Corporation St.

BIRMINGHAM, Eng., Dec. 12.—The year promises to end quietly with no marked increase of activity. Some orders placed lately specify delivery in the new year. The returns of production for November failed to realize the optimism of a month ago. The output of pig iron was 583,500 tons, a reduction of 3000 tons and of steel ingots 672,800 tons. Under the latter head the drop of 6000 tons for the month is an unpleasant surprise. This demonstrates that buying has been largely precautionary, and this is confirmed by the general pressure for specifications coming to merchants and others during the past week or two.

The tone is decidedly hopeful. The London & North Eastern Railway Co. announces its intention of spending £6,000,000 on rolling stock and bridges, which will be placed in the new year. The absence of rail orders is a remarkable feature, and this business surely cannot be long delayed. A coincident deficiency is the lack of shipbuilding orders, for which a number of idle mills are waiting, no other class of business promising adequate employment for their available capacity.

The complete absence of advances speaks for itself of keen competition and large unemployed capacity. Finished steel covering joists, sections, etc., are quoted at £9 5s ($43.47) but a specification generally brings acceptance of £9 ($42.30).

Sterling—$4.70

The slump in tin plate is a misfortune just now as it has compelled several Welsh mills to seek outside orders for billets, bars, etc. This semifinished material is about 5s ($1.17) cheaper. Fortunately, foreign steel is not being pushed onto the market or the depression of prices would be greater. Belgian billets can be bought here at £6 15s ($31.72) against the English delivered price of £7 5s ($34.07).

A lot of structural work is in the hands of engineers, and is expected to bring orders for shapes early in January. In this line the ability to buy Belgian joists at £7 2s 6d ($33.48) delivered deprives the British mills of a lot of business. The exporting merchants are taking advantage of steel bars obtainable at £6 2s 6d ($28.78) f.o.b. Antwerp.

Pig iron recovers very slowly, as the production figures indicate. There is an increase of only two furnaces for the month. The Barrow district seems more promising, furnaces there having increased to 15 against the recent figure of 11. Another furnace is likely to be lighted before the end of the year. That district is selling its high class iron to the Continent and has arranged for some shipments to America, which are to come in shortly. But prices are unchanged though an advance in all grades early next month has been talked of.

Prices have eased a little, both in Cleveland and the Midlands. In all districts, there are stocks to be got rid of, those on the west coast still being rather heavy. Fortunately, coke is sufficiently plentiful to discourage price advances, which just enables the furnace to see their way to a profit. Durham furnace coke continues at £1 5s ($5.87) delivered.

The outlook for wrought iron is rather gloomy, the only branch showing any vigor being best iron, which easily realizes £15 ($70.50). For nut and bolt making, the price continues at £11 15s ($55.22) and as Belgian No. 3 material can be bought here at £8 delivered, makers naturally, are obliged to take this in spite of its rather poor quality. The impression, however, is that eventually soft steel will be invariably preferred.

Steel scrap has gone off completely. Buyers do not propose to increase their financial obligations by December purchases, and will postpone buying until the new year. As everybody anticipates steady prices it is considered a safe policy.

The galvanized sheet trade maintains a large output but has hardly succeeded in holding prices. Some sales are understood to have been made at £17 5s ($81.07) though the general figure is £17 7s 6d ($81.66). Unless buying recovers shortly some further depression prices seems inevitable.

French Trade Awaits German Pact

European Special Service

Office of IRON TRADE REVIEW,
23 Rue de la Bienfaisance

PARIS, Dec. 12.—The iron and steel trade is following with interest the proposed Franco-German trade pact which is now being studied by German experts. The latter will return to

Franc—$0.055

Paris to submit their report to a plenary assembly to be held Dec. 11. Little information has been given to the press relative previous assemblies but it is rumored that an accord will soon be reached. It is yet too early to say what the purport and scope or this commercial entente will be. The opinion is, however, that, being a first step, it will be confined to outlining a basis

Current Iron and Steel Prices of Europe

Prices Converted into Dollars at Rates of Exchange, December 22

	British Gross Tons U. K. Ports		*French* Metric Tons Channel Ports		*Belgian and Luxemburg* Metric Tons Channel Ports		*German* Metric Tons Rotterdam or North Sea Port	
Export Prices f. o. b. Ship at Port of Despatch—By Cable	£ s d		Francs		Francs		£ s d	
PIG IRON								
Foundry No. 3, Silicon 2.50-3.00	$25.91	5 10 0*	$18.06	335	$17.91	360	$21.20	4 10 0
Basic	18.84	4 0 0	18.33	340	17.91	360	23.55	5 0 0
Basic-bessemer	21.43	4 11 0†	17.52	325	16.92	340	21.20	4 10 0
Hematite, Phosphorus 0.02-0.05	20.84	4 8 6	22.64	420	.....	...	27.08	5 15 0
SEMIFINISHED STEEL								
Billets	$30.62	6 10 0	$25.33	470	$25.12	505	$25.91	5 10 0
Wire rods	51.81	11 0 0	31.26	580	31.84	640	32.26	6 17 0
FINISHED STEEL								
Standard rails	$41.21	8 15 0	$27.49	510	$30.35	610	$29.44	6 5 0
Merchant bars	1.79c	8 10 0	1.17c	480	1.23c	545	1.24c	5 16 0
Structural shapes	1.68c	8 0 0	1.20c	490	1.20c	525	1.21c	5 13 0
Plates, ship, bridge and tank	1.84c	8 15 0	1.72c	705	1.47c	650	1.46c	6 17 0
Sheets, black, 24 gage	2.63c	12 10 0	3.05c	1,250	2.94c	1,300	2.94c	13 15 0
Sheets, galvanized, 24 gage, corrugated	3.63c	17 5 0	4.26c	1,745	5.09c	2,250	3.74c	17 10 0
Bands and strips	2.31c	11 0 0	1.68c	690	1.76c	775	1.82c	8 10 0
Plain wire, base	2.42c	11 10 0	2.24c	920	1.92c	850	1.82c	8 10 0
Galvanized wire, base	3.15c	15 0 0	2.98c	1,220	2.49c	1,100	2.19c	10 5 0
Wire nails, base	3.05c	14 10 0	2.44c	1,000	1.92c	850	2.67c	12 10 0
Tin plate, base box 108 pounds	$ 5.53	1 3 6	.....	...	.....	....	$ 5.53	1 3 6
Domestic Prices at Works or Furnace—Last Reported								Renten Marks
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$19.08	4 1 0	$16.44	305(2)	$18.66	375	$20.24	88
Basic pig iron	18.84	4 0 0	16.71	310(1)	18.66	375	22.54	98
Furnace coke	3.94	0 16 9	7.65	142	6.97	140	5.52	24
Billets	30.62	6 10 0	23.18	430	26.12	525	25.76	112
Standard rails	1.84c	8 15 0	1.17c	480	1.38c	610	1.41c	135
Merchant bars	1.84c	8 15 0	1.24c	510	1.29c	570	1.27c	122
Shapes	1.79c	8 10 0	1.20c	490	1.23c	545	1.22c	117
Plates, ship, bridge and tank	1.95c	9 5 0	1.71c	700	1.53c	675	1.46c	140
Sheets, black, 24 gage	2.73c	13 0 0	2.93c	1,200	2.88c	1,275	2.50c	240
Sheets, galvanized 24 gage, corrugated	3.68c	17 10 0	4.15c	1,700	5.20c	2,300	4.69c	450
Plain wire	2.42c	11 10 0	2.34c	960	1.92c	850	1.77c	170
Bands and Strips	2.42c	11 10 0	1.71c	700	1.81c	800	1.62c	155

* Middlesbrough; †Scotch foundry iron; (1) Basic-bessemer; (2) Longwy. British export furnace coke £0 16s 9d ($3.94) f. o. b. Ferromanganese, £14 10s 0d ($68.30) f. o. b. The equivalent prices in American currency are in dollars per ton for pig iron, coke semifinished steel and rails; finished steel is quoted in cents per pound and tin plate in dollars per box. British quotations are for basic open-hearth steel; French, Belgian, Luxemburg, and German are for basic-bessemer steel.

for the reciprocal exchange of raw materials. Reports have been circulated that price agreements and distribution of markets would be included but this has not been confirmed.

Statistics have just come to hand relative to France's foreign trade in iron and steel products during the first ten months of 1924. Exports of pig iron during this period amounted to 617,155 tons, compared with 483,753 tons for the corresponding period of 1923. Exports of iron and steel products were 1,836,563 tons. This is an increase of nearly 400,000 tons over 1923 exports for the same period.

The export and domestic demand for phosphorus pig iron is brisk. Foundries are finding it difficult to obtain their pig iron requirements. Lorraine foundry No. 3 (2.50 to 3.00 silicon) remains unchanged at 305 francs ($16.77) per metric ton f.o.b. furnace. Exports of hematite pig to Italy have slowed down. The domestic market has also weakened. Producers are quoting 440 francs ($24.20) and offer prompt shipment.

The situation of the semifinished steel department remains unchanged. Prices are firm and practically all mills are heavily committed.

Demand for finished steel products has tapered off. Jobbers are reducing stocks for inventory. Merchant bars are being offered at 510 francs ($28.05). Heavy shapes are being done around 490 francs ($26.95). Mills are promising from six to eight weeks shipment on new business.

Raw Steel Pact Helps German Market

European Special Service

BERLIN, Dec. 14.—The final signature of the German raw steel union has caused a fair improvement on German export and domestic markets. Moreover as one of the first steps of the new union was the curtailment of output by 20 per cent, with the exception of semifinished materials which were cut only 10 per cent. English inquiries in this market for billets continue, although it is difficult to procure supplies. The export of finished goods has generally improved and some works even decline to sell at current prices, anticipating a further rise. Wire rods are now sold to the Scandinavian states at about £6 17s while bars have advanced to £6 5s. Large deliveries on reparations account have been made to Jugoslavia, especially rails, which will be needed for the construction of the Belgrad-Ueskup and Belgrad-Agram railroads.

The home market has considerably improved despite the fact that large tonnages of Lorraine and Belgian rolled products have been shipped to Germany in order to be imported prior to Jan. 10, 1925, when the tax free import of such material no longer will be permitted. Tonnages thus imported from Lorraine mills stocked here are estimated at about 200,000 metric tons. The situation on plates is not good and Rhine steelworks have been compelled to discontinue the output of plates. A characteristic sign is that platemakers as well as pipe makers and rolling mills are planning to establish producers, unions to increase prices.

The situation in Upper Silesia continues bad. The pig iron output of that country has decreased to 290,000 tons this year, compared with 409,000 tons last year and 613,000 tons in 1913. The output of semifinished products is estimated at 360,000 tons, against 515,000 tons in 1923 and 730,000 metric tons in 1913.

Khyman Brown, 115 Marcy Place, New York, operator of a structural iron and steel works, has filed a petition in bankruptcy, with $10,773 liabilities and no assets.

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Charles J. Stark, - - - - - - - - - - - Editor
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FOREIGN OFFICES

BIRMINGHAM, ENG. - - - - - - - Prince's Chambers
LONDON, ENG. - 2-3 Caxton House, Westminster, S. W. 1
PARIS, FRANCE - - - - - 23 Rue de la Bienfaisance

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What Will 1925 Bring Forth?

FOR three years past, December has closed for the iron and steel industry under conditions of expanding trade. In 1922 the upward turn in production was made in December and the rise in prices followed in January 1923. This ascending movement ran through a period of six months, culminating in May. The change for the better to follow, was not registered in production until in January 1924. The reversal of a period of falling prices also came within the same month. The upward movement both in prices and production, in 1924, however, was short-lived compared with the preceding 12 months. It lasted only three months and ended in March.

Now 1925 is being ushered in with conditions, on their surface at least, largely identical with those of the two previous years. What will the complete year bring forth?

For the iron and steel industry, 1923 was one of unusually high production and fairly prosperous as a whole. It established a new record in pig iron output. The year 1924 was a distinct disappointment. Production of pig iron, it is estimated, will be about 31,100,000 tons, a loss of over 9,000,000 tons or about 22 per cent from 1923. The steel output, ingots and castings, is placed at about 37,750,000 tons or more than 7,000,000 tons below 1923. Summed up, it was about a 60 per cent year.

As 1924 closed, pig iron production was running at the annual rate of 31,000,000 to 32,000,000 tons and steelworks and castings, at well over 40,000,000 tons. Of the three years, none has begun under more generally promising conditions than 1925.

When the Production Gage Varies

A REVOLVER in the hands of a thug is a threat and in the hands of a policeman a protection. Similarly, the value of production figures depends upon the circumstances.

Take the Chicago district for example. Toward the end of the first quarter of 1924, when a red light occasionally showed up on the horizon, production figures painted a false picture. The Illinois Steel Co. and the Inland Steel Co. had 28 of their 30 blast furnace stacks making pig iron. The ingot operations hovered around 90 per cent. But soon prices began to slip and it was seen that this feverish activity was the effort to work off tonnage booked when the market was strong.

At this time ingot and pig iron production in the Chicago district are rising sharply. From a low point of 12 active stacks in midsummer these major producers have come-back to 22 stacks. Their ingot operations have ascended from some 30 per cent to past 85. This time the mills appear bent on clearing the decks of comparatively cheap business, of tonnage booked prior to the two advances in prices as a means of energizing the market. The situation today would seem to be the reverse of the earlier one.

Production figures are invaluable as a gage of business but unless they are accorded a proper setting they may show red or green falsely.

World Gain Intensifies Competition

IMPROVEMENT in business and industrial conditions at the close of 1924 is world-wide, and because 1925 will usher in better times for the majority of countries with which we have commercial relations, the gains made in the United States seem more assured of permanence. In this country, the defeat of radical political forces, the high level of wages and of employment, restoration of the farmers' buying power and increasing manufacturing operations to supply a long pent-up demand are the principal features of the New Year's picture.

In Europe a change much similar has occurred in recent months, chaos giving way to order brought about by a series of constructive events. The adoption of the Dawes plan and successful flotation of the German loan is stabilizing the value of the mark and encouraging all German enterprise to new effort. The French franc has been given stability as a consequence of a $100,000,000 loan. The Belgian franc shows a firmer tendency. Sterling is sound, and the election of a conservative government in Great Britain is giving a new stimulus to British industry. These and other de-

velopments of lesser importance place Europe in a position decidedly better than a year ago.

Records of the world's production of iron and steel compiled by IRON TRADE REVIEW, that will be printed in the annual number, Jan. 1, shows evi dence of the recuperation of productive capacity in France, Belgium and Germany, due to the construction of new plants or extension of old. Germany doubled its 1923 output of pig iron in 1924, and exceeded Great Britain's. Germany also increased its output of steel ingots and castings, with 100,000 tons over Britain's. Production of iron and steel in France and Belgium exceeded the records of 1923. Great Britain's output of pig iron was 40,000 tons less than in 1923, and its steel output was about 82,000 tons less. In Europe generally, in 1924, there was an excess of production, while prices were unsettled. France and Belgium made large sales to the United States, because of the low values of their francs.

As the situation is shaping up, Europe is in a much better position today than in years for competing against the United States in export markets. For the American manufacturers, however, this resistance will be offset by greater opportunities in the domestic markets. What the new year will bring forth with both Europe and the United States on a much stronger business basis will be one of the interesting developments in the history of world trade.

Coke Wage Advance Indicates Trend

WHILE economists are forecasting an upward tendency of wages in 1925, the increase granted to workers in the Connellsville coke fields Dec. 16 cannot be construed as the start of or a cause for any such movement. When the independent coke producers in June, 1924, reduced wages 20 to 33 per cent, IRON TRADE REVIEW stated that it represented a temporary phase of the coke business. Now when the industry is emerging from a period of depression, the restoration is not surprising. The wage rates have been advanced 25 to 50 per cent by the leading independent operators, to the scale that was in effect from Aug. 23, 1922, to June, 1924. The new rates are practically the same as those that have been maintained by the Steel corporation's coke subsidiary. They represent the highest wartime levels.

Wages of coke workers reached the peak in September, 1920. The four general classifications, cagers, inside labor, chargers and outside labor then received approximately $7.50; $6.50 and $5.50 per day, the latter wage for outside labor and chargers. These wages continued in effect until May 16, 1921, when there was a decided drop, followed by another less pronounced cut Aug. 21, 1921. On Aug. 23, 1922, they were moved back at one sweep to the pinnacle, and remained there until the worst month of the depression in 1924.

The United States Steel Corp. has reduced its common labor rates at blast furnaces and steel plants three times in the last 10 years each time during the dull months of 1921. Its rates today are 125 to 150 per cent over 1914. In basic industries as a whole, wage rates average about 100 per cent in contrast with what they were 10 years ago. Political and economic factors last June warranted the forecast that wages generally would not be reduced, a forecast that has been borne out. Now that employment is on the upgrade and prosperity in sight, increases appear more probable.

Because of the advance in coke workers' wages, 75 cents to $1 a ton will be added to cost of production. Some pig iron producers believe this amount will be added to the cost of their manufacture. Other producers of raw material, notably iron ore, look for higher prices for their products. But while the advance for coke workers may be indicative of a general upward tendency, much more will be necessary to start another important cycle of wage increases.

Business Needs No Policeman

SINCE the federal trade commission was created, its authority on various matters pertaining to external police regulations on business and industry has been questioned, many times. Whether or not its implied powers are constitutional in all respects, the commission, nevertheless, has been sort of a constabulary in the business field with a jurisdiction akin to a grand jury. To some of its supposed inquisitorial powers, several United States Supreme Court decisions within the last year have dealt severe blows.

In a minority report, which the trade commission declined to make a part of its regular annual report to congress, Commissioner Nelson B. Gaskill proposes legislation which will authorize the commission instead of issuing a complaint, in every case of supposed unfair or discriminatory trade practices, with its attendant process of pleading, trial and argument, to dispose of the matter upon an agreement by a respondent business concern or individual to discontinue the questioned practice, provided the respondent admits the facts charged against him. This view of Commissioner Gaskill is distinct progress toward sound public understanding toward business. It is progress toward good sense in the relations between government and business, and such legislation would be of a welcome nature to all who are not demagogs or muckrakers.

The minority report of Commissioner Gaskill

states that it should be possible for the trade commission upon "a state of facts as to which there is no doubt, which in the opinion of the commission constitutes within the law an unfair method of competition, to agree with the respondent party or parties for its discontinuance; provided the respondent party admits the facts, accepts the judgment of the commission as to the law, is willing to discontinue, and further to stipulate that if he resumes the practice such stipulation may be used against him in any complaint subsequently issued upon that charge by the commission."

This should be fair enough procedure for any eventuality. Commissioner Gaskill repeatedly, during his connection with the commission, has contended that the commission had power to adopt such a nonstatutory method of procedure. The question has been voted upon by the commission, but was turned down as a fixed policy.

Another recommendation of Commissioner Gaskill is that the commission seek to give business a development of self-government in its own ranks. The trade practice submittal, which the commission has developed, has decided limitations in that the result of the submittal has no force or effect. Many practices exist, Mr. Gaskill pointed out, of which business groups desire to be rid, which cannot be placed by this method upon a basis receiving legal sanction. Mr. Gaskill proposes that the trade practice submittal be legalized.

Decided improvements should be made in federal trade commission procedure. Present methods are expensive to the taxpayers, are ineffective to a large extent and place unnecessary question upon the repute of business that is not seeking to evade the law. The federal trade act is unlikely to be repealed, or amended soon. But a cleaning up would not come amiss in its procedure.

Yesterdays in Industry

Trade and Technical News from IRON TRADE REVIEW 10, 20 and 30 Years Ago

December 20, 1894

CHARLES M. SCHWAB, general superintendent of the Homestead steel works, who had been ill for several weeks, was to sail in January for a tour of Europe and Egypt for the benefit of his health. Thirty years later finds Mr. Schwab hale and hearty so that the trip apparently was beneficial.

* * *

The Bethlehem Iron Co. was awarded a contract for 1200 tons of armor plate for two Russian warships. The Harveyized plate produced by this company was signally recognized since this contract was taken in competition with world makers.

* * *

Miners in underground mines in the iron ore regions were earning about $1.50 per day and only in rare instances could one command $2. An increase in the price of ore was being urged to provide higher wages for these workers. Bessemer pig iron was selling then at $10.

* * *

December 22, 1904

AN AGREEMENT had been concluded between steelmakers in Great Britain, Germany, France and Belgium and there seemed some evidence that American producers had entered into it in some degree. The Monroe Doctrine apparently was being applied, foreign makers keeping away from Mexico, South America, the Pacific and Gulf coasts in return for the foreign pool's prices being maintained.

* * *

The death of Sir Lowthian Bell in England closed the life of the greatest blast furnace authority in that country. After his visit to the United States in 1890 he wrote largely on the pig iron industry in the United States, said to be the most comprehensive statement of the industry's activities ever written to that time.

* * *

Rail requirements of the Pennsylvania railroad for 1905 were 102,000 tons of standard rails compared with 202,000 tons in 1904. The reason for the smaller tonnage apparently was the fact that a large part of the latter tonnage was to be carried over to the next year.

* * *

Prices for the first quarter of 1905 were reaffirmed by the billet pool. This meant little, however, as steel was selling for $1 to $2 above the pool price. The pool was simply holding a minimum, as had been done in other cases when prices for current business was much higher. Plates were advanced $2 and bars $1 to $2 by their respective pools.

* * *

December 24, 1914

AS AN object lesson to the men in the campaign for less drinking of intoxicants officials of the Illinois Steel Co. at Chicago had a wineless banquet. Instead of $5 a plate at a downtown hotel they partook of a $1 dinner at the club house at the works, the remaining $4 per plate being given for the use of the needy among the workers.

* * *

Announcement by the United States Steel Corp. that no cut would be made in the wages of common laborers, at a time when most wages were being reduced, forecast better business conditions and aided the situation sentimentally.

* * *

An increase of 5 per cent in freight rates was granted eastern lines by the interstate commerce commission. As a result business conditions at once began to pick up and railroad buying showed an increase.

Some Prices from the Past

	Dec. 20, 1894	Dec. 22, 1904	Dec. 24, 1914
Basic, Pittsburgh	....	16.60	13.45
Bessemer, Pittsburgh	10.65	16.85	14.70
No. 2 foundry, Pittsburgh	10.25	17.35	13.70
No. 2 foundry, Chicago	9.75	17.00	13.00
Lake Superior, Chicago	13.00	18.00	15.75
No. 2 southern, Birmingham	....	13.75	9.50
Bars, steel, Pittsburgh	....	1.40c	1.05c
Bars, steel, Chicago	1.25c	1.465c	1.19c
Plates, Pittsburgh	1.15c	1.40c	1.05c
Shapes, Pittsburgh	1.25c	1.50c	1.05c
Heavy melting steel, Pittsburgh	....	16.50	10.50
Heavy melting steel, Chicago	7.25	13.50	8.00

Furnace Coke Plants Lead Others

From 1913 to 1922 By-Product Ovens Serving Blast Furnaces Increased More Rapidly Than Non-Furnace Units—Return from By-Products Offsets Narrow Margin of Profit from Sale of Coke

IN AN extensive report on "Coke and By-Products in 1922," prepared by F. G. Tryon, of the United States geological survey, some interesting trends in the by-product and beehive coke industry of the country are disclosed. For instance, it is shown that the furnace by-product coke plants have been growing more rapidly both in numbers and in output than the nonfurnace plants, contrary to the impression commonly prevailing.

In the 10 years, 1913 to 1922, inclusive, the number of nonfurnace by-product plants, or those whose output is not disposed of to blast furnaces, rose from 15 to 21, but the number of furnace plants more than doubled, rising from 21 to 43. The growth of the furnace branch of the industry is even more striking as measured by the record of production.

Figures also fail to bear out the contention that the nonfurnace plants, as a group, operate more steadily than the furnace plants. During 1920, for example, when the market was active, the furnace operators produced 81.8 per cent of the annual whole. Their share in the succeeding year of the depression, 1921, was 82.2 per cent. Thus instead of decreasing during a depression, as might have been supposed, the percentage of the total output contributed by furnace plants actually increased.

Even when measured monthly, the relative proportions of furnace and nonfurnace coke have been remarkably constant during the last three years. The following table shows the number and production of by-product coke plants connected with iron furnaces, 1913-1922:

Year	No. of plants Furnace	Other	Coke produced (net tons) Furnace	Other
1913	21	15	9,346,855	3,367,845
1914	23	14	8,029,727	3,190,216
1915	24	16	10,448,015	3,624,886
7916	29	17	14,446,576	4,622,785
1917	33	19	17,321,145	5,118,135
1918	39	21	20,124,218	5,873,362
1919	43	22	20,019,097	5,118,524
1920	45	23	25,212,745	5,621,206
1921	45	22	16,231,374	3,518,206
1922	43	21	23,889,702	4,660,843

Capacity of the by-product ovens completed up to the end of 1922 was 119,898 tons of coke daily. The capacity of the 403 ovens under construction at the end of the year was 5900 tons of coke daily.

In practice it is impossible to operate continuously at 100 per cent of capacity, for most plants are handicapped from time to time by shortage of coal, mechanical breakdowns, lack of labor, and other difficulties. As the experience of the war period shows, an average operation for the country as a whole of 85 per cent of maximum capacity, or at the most 90 per cent, appears to be the upper limit of probable performance. From Jan. 1, 1919, to Jan. 1, 1923, the potential capacity increased by 10,100,000 tons a year. The end of 1922 found the country equipped with plants, either built or in course of construction, capable of producing by-product coke at the rate of 39,000,000 to 41,000,000 tons, or say, 40,000,000 tons a year, says the report.

In comparing the average value of the coke produced with the cost of the coal per ton of coke it is shown that in 1922 the value of beehive coke per ton as reported by the operators was $5.84, while the cost of the coal charged in the ovens per ton of coke drawn was $4.05. The margin of $1.79, however, must not be assumed as representing profit, for coal is only one item of the costs of the operators. Out of this difference must come the cost of labor, allowance for depreciation of plants and equipment, and all overhead charged, as well as taxes, before any profit can be shown.

The margin between the value of by-product coke and the cost of coal is extremely small, and were it not for the by-products the operator of retort ovens would be losing money. In most of the years shown the cost of coal per ton of coke has been less than the reported value of the coke, but in 1921 and again in 1922 the cost of coal exceeded the value of the coke. Thus in 1922 the average value of the coke produced, according to by-product operators, including their own estimates of the value of the quantity used in associated works but not sold, was $6.59 a ton, but the average cost of coal per ton of coke was $6.81. The deficit, if made up at all, had to come from the by-products, which had a value that year of $3.32. The total value of all products was $9.91 per ton of coke produced, leaving a difference between the value of products and cost of coal of $3.10. Though larger than in

The cost of coal and value of all products per ton of coke produced in the years 1913-1922 are shown in the following table:

	—Beehive coke—			—By-product coke—				
Year	Value of coke *per ton	Cost of coal	Excess, coke over coal	Value of coke *per ton	Value of all by-products	Total value of products	Cost of coal	Excess, products over coal
1913	$2.39	$1.75	$0.64	$3.82	$1.41	$5.23	$3.27	$1.96
1914	2.15	1.67	.48	3.39	1.65	5.04	3.19	1.85
1915	2.07	1.61	.46	3.45	2.19	5.64	3.24	2.40
1916	2.69	1.96	.73	3.95	3.25	7.20	3.62	3.58
1917	4.81	3.17	1.64	6.18	3.01	9.19	5.20	3.99
1918	6.21	3.65	2.56	7.42	3.07	10.49	6.00	4.49
1919	5.16	3.39	1.76	6.37	2.72	0.09	5.65	3.44
1920	†7.94	4.90	3.04	10.15	3.40	13.55	7.73	5.82
1921	5.45	3.82	1.63	5.95	3.46	9.41	7.03	2.38
1922	5.84	4.05	1.79	6.59	3.32	9.91	6.81	3.10

(All figures reduced to value per ton of coke produced)

*Includes operators' statements of the value of coke consumed by them in associated enterprises but not sold, except that in 1918 and 1920 the value of such coke was estimated by the geological survey for each state at the average value for that state of the part of the product reported sold.

†Revised from preceding report.

Mr. Tryon's analysis also shows that the quantity of coke required to make a gross ton of pig iron declined from an average of 2433.3 pounds in 1913 to 2176.3 pounds in 1922. The following table shows coke consumed in the manufacture of pig iron:

Year	—Coke consumed— Net tons	Pounds per gross ton of pig iron produced	Pig iron produced* (gross tons)
1913	37,192,287	2,433.3	30,326,130
1914	27,070,856	2,354.4	22,976,856
1915	33,224,328	2,252.0	29,535,308
1916	44,431,905	2,285.3	38,844,598
1917	44,493,316	2,339.7	37,863,643
1918	45,703,594	2,375.2	38,422,175
1919	35,250,943	2,310.2	30,549,930
1920	41,976,171	2,305.6	36,300,024
1921	18,162,147	2,200.6	16,579,653
1922	29,213,893	2,176.3	26,995,173

*Excludes pig iron made with anthracite and charcoal but includes small quantities made with electricity and bituminous coal.

(From annual report of the American Iron and Steel Institute)

The United States in 1922 regained the position as the world's leading producer of coke, which it had lost to Germany in 1921, the report shows.

Germany's lead was, however, brief. Even under the handicap of the coal and railroad strikes of 1922, the United States produced 33,678,000 metric tons to Germany's 29,917,000. In fact, out of the approximate total of 82,000,000 tons produced in the world in 1922, 41 per cent was contributed by the United States.

Current Statistics of Industry

Beehive Coke Production Continues to Gain

Washington, Dec. 23.—The production of beehive coke continued to improve in the week ended Dec. 13, according to the geological survey. Estimates of the total output based on shipments over the lines of the principal coke carriers place the total output at 192,000 net tons, an increase of 18,000 tons, or more than 10 per cent. The records show that this was the largest weekly output since the first of May. The present rate of production, however, is still 20 per cent below that prevailing a year ago. The following table shows the record of output in net tons by weeks:

	Week ended		
	Dec. 13, 1924a	Dec. 6, 1924b	Dec. 15, 1923
Pennsylvania & Ohio..	146,000	127,000	192,000
West Virginia	10,000	12,000	16,000
Alabama, Kentucky, Tennessee & Georgia	19,000	20,000	15,000
Virginia	8,000	8,000	8,000
Colorado & New Mexico	5,000	4,000	5,000
Washington & Utah ..	4,000	3,000	4,000
United States total ..	192,000	174,000	240,000
Daily average	32,000	29,000	40,000

(a) Subject to revision. (b) Revised from last report.

The production of soft coal is increasing. The output in the week ended Dec. 13 was 10,727,000 tons against 10,612,000 in the preceding week.

Increase in Living Cost 2 Per Cent Since July

The increase in the cost of living between Oct. 15 and Nov. 15 was only one-tenth of 1 per cent, although all of the separate items showed variations, according to the National Industrial Conference board. Between July 15, and Nov. 15, 1924, there was an average increase of 2.2 per cent. This change was occasioned by increases in the average cost of food, clothing, fuel and sundries, and a decrease in the average cost of shelter. The average cost of light, which had been slightly lower during this period, had returned in November to the level of July, 1924.

Between July, 1920, when the peak of the rise in the cost of living since 1914 was reached, and November, 1924, the cost of living decreased 19.2 per cent. The increase in the cost of living since 1914 was 65.2 per cent.

Provides Pension Fund

Chicago, Dec. 23.—A daughter of the late John H. Barker, founder of the Haskell & Barker Car Co., now a part of the Pullman Car & Mfg. Corp., has created the Barker Foundation with a gift of $750,000 from the Barker estate. Out of it will be provided pensions for Haskell & Barker employes, now 70 years or older, who were with the company 15 years prior to Jan. 1, 1916, when Pullman absorbed it. Some 250 employes will receive $30 to $45 a month beginning Jan. 1. The Barker estate was estimated at $25,000,000.

Furnaces Ready May 1

Birmingham, Dec. 23.—The four new open-hearth furnaces which the Tennessee Coal, Iron & Railroad Co. is erecting at Fairfield, Ala., are to be ready for operations May 1, 1925. These units will absorb all of the company's pig iron. After that date consumers who now are getting their foundry pig iron from the company will have to get their supplies elsewhere. One of the company's largest customers has been the United States Cast Iron Pipe & Foundry Co.

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Automobile Production Is Down in November

Washington, Dec. 23.—The production of automobiles dropped sharply in November. As reported by the department of commerce the output of passenger cars was 195,279 against 257,915 in October and 284,939 in November, 1923. For trucks the output was 26,484 compared with 31,455 in October and 28,085 in the corresponding month of 1923. The combined production of cars and trucks was 222,217, which was the smallest for any month since September, 1922. It was 23 per cent lower than the October total and 29 per cent under that for November, 1923. Aggregate output of cars and trucks for the 11 months of the year was 3,342,836 against 3,710,000 in the same period of 1923. The monthly record:

Passenger Cars

	1922	1923	1924
January	81,696	223,822	287,353
February	109,171	254,782	336,371
March	152,962	319,789	348,356
April	197,224	344,661	337,045
May	232,462	350,460	279,453
June	163,053	337,442	217,935
July	225,103	297,413	237,668
August	249,498	314,431	251,551
September	187,711	298,964	260,171
October	217,582	335,041	257,915
November	215,362	284,939	195,279
December	208,016	275,472	.....

*Revised.

Trucks

	1922	1923	1924
January	9,596	19,732	28,929
February	13,360	22,173	31,161
March	20,036	35,284	34,138
April	22,665	38,085	36,169
May	24,120	43,730	33,421
June	26,354	41,173	27,894
July	22,083	30,692	25,251
August	24,711	30,872	27,523
September	19,495	28,578	30,810
October	21,824	30,139	31,455
November	21,967	28,073	26,848
December	20,394	27,762	.....

*Revised.

Trumbull Plan Indefinite

Youngstown, Dec. 23.—Definite plans for the addition of five more open-hearth furnaces at the Trumbull Steel Co.'s Warren plant have not been made, according to President Jonathan Warner. The improvement has been contemplated for sometime, but with no decision.

Carpenters Want $1.50

Chicago, Dec. 23.—Union carpenters are said to be laying the groundwork for a movement to place all building trade wages on a basis of $1.50 per hour next May 1. Employers are reported to have turned down an offer of continuance of the present $1.25 wage in return for closed shop conditions. Several trades now are on a $1.50 level.

The Business Trend

December 25, 1924

BY JOHN W. HILL, FINANCIAL EDITOR

NATURE has bestowed a Christmas gift upon the American people in the form of the most valuable farm crops in five years. The government's final estimate places the worth of leading crops at $9,479,902,000.

That figure is $783,013,000 higher than the total for 1923. It is $1,663,882,000 greater than that for 1922. Although the value is high the volume of products does not match up quite so well. The combined acreage in 1924 was 355,210,400 acres against 355,594,730 acres in 1923.

Corn still holds the spectre as king of crops. The yield was smaller than in 1923 by 600,000,000 bushels, but the value of $2,405,408,000 bushels, was $188,000,000 more than that for last year.

Cotton ranked second in value with $1,683,274,000. Hay was third with a value of $1,467,648,000 and wheat was fourth with a value of $1,136,596,000. The aggregate world crop of wheat is 440,000,000 bushels below that of 1923. As a result of high prices the winter acreage of American wheat was increased by 6½ per cent.

Wheat Prices Soar

The small world crop of wheat explains the sustained flight of wheat values. With the exception of the growers of live stock, particularly range cattle, the farmers are in the best economic position today that they have been in half a decade.

Their purchasing power has been restored. They can again exercise an effective demand for goods. That is the magic fact which illumines the industrial outlook for 1925. The farmers will project a tremendous stimulus into the situation.

One of the most significant of recent developments was the advance of wages by independent coke producers. This may not foreshadow an immediate rise in the cycle of wage rates. But it does mark the end of declining ones.

Wages Equalized

These advances represented an equalizing process with other scales prevailing in the industry. That sort of thing probably will happen in industries where wages had been cut below the average during the recent depression.

When an upward swing of the general wage structure may be expected is problematical. If prices and living costs soar and employers begin to bid against each other for labor, wages naturally will rise, For the present there is a gradual increase in demand for help and in living costs as well.

As computed by the National Industrial Conference Board the cost of living on Dec. 1 was 65.2 per cent above the level of July, 1914. It has increased 2.2 per cent since last July. The cost of living dollar is now worth 60.5 cents according to the 1914 standard. It was worth more than 62 cents last summer. Between July, 1920, when the peak of the rise of the cost of living since 1914 was reached, the index of living costs has declined 19.2 per cent.

The Barometer of Business

Weekly Comparison

	Last week	Week before	One mo. ago	One year ago	1913
Business failures ..	468	358	311	440	...
Cash ratio Fed. Res. System %..	73.9	75.2	76.8	75.7	...
Loan Rate, 4-6 mos. N. Y. %	3½-3¾	3½-3¾	3¼-3½	5	5½
Aver. price 25 industrial shares ..	$130.22	$127.11	$126.43	$108.88	$58.19
Aver. price 25 railroad shares	$79.87	$78.83	$77.58	$58.25	$82.97
Av. price 40 bonds	$81.96	$82.16	$81.86	$76.60	$93.00
Car loadings week ended Dec. 6..	968,256	878,631	1,015,704	913,921	*837,953
Commercial loans, 743 member banks (000 omitted)	$8,189,223	$8,194,076	$8,240,731	$7,925,456	.....

*1920

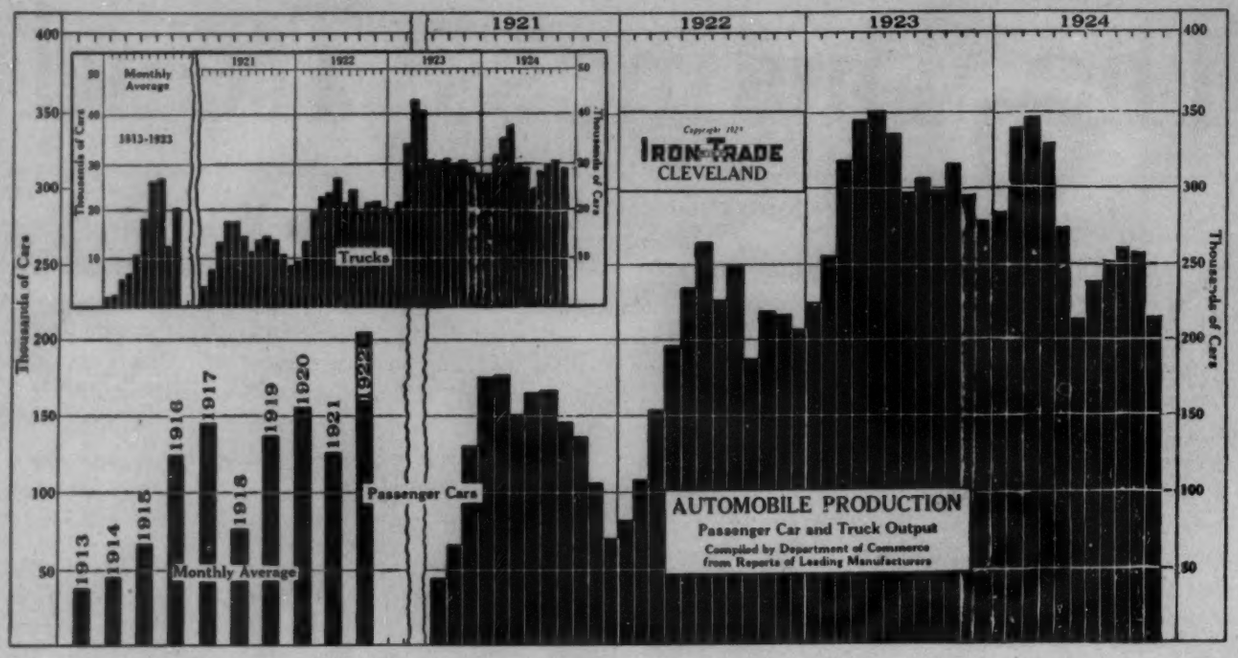
Foreign Exchange (Demand)

	Normal	Last week close	One week before	One month ago	One year ago
Sterling	$4.86	$4.70	4.69c	$4.63	$4.34
Francs	19.3c	5.38c	5.35c	5.30c	5.05c
Lira	19.3c	4.27c	4.30c	4.33c	4.31c

Monthly Comparison

	Nov.	One Month before	One Year ago	1913 Mo. average
Dodge Building awards in 27 states (sq. ft.)	49,012,200	47,489,800	52,599,500	31,250,000
Business failures: Number	1,653	1,696	1,704	1,336
Liabilities ..	$31,123,910	$36,098,804	$50,291,708	$22,732,000
Exports	$494,000,000	$527,000,000	$401,483,872	$233,195,000
Excess of gold imports	$13,160,407	$15,576,274	$39,010,642	††$630,716
Bureau of labor price index ..	152.7	151.9	152.1	100
Bradstreet's price index	146.4	144.4	145.4	100
Economist's British price index	178.2	178.4	167	100
Nat'l Industrial Con. board living cost index.	165.2	165	165.3	‡100
New incorporations	$574,096,000	$543,490,000	$811,848,599	$49,301,000
Railroad net earnings	*$127,105,000	$116,000,000	$103,775,700	$59,301,000

††Excess of gold exports. ‡July, 1914. *October.

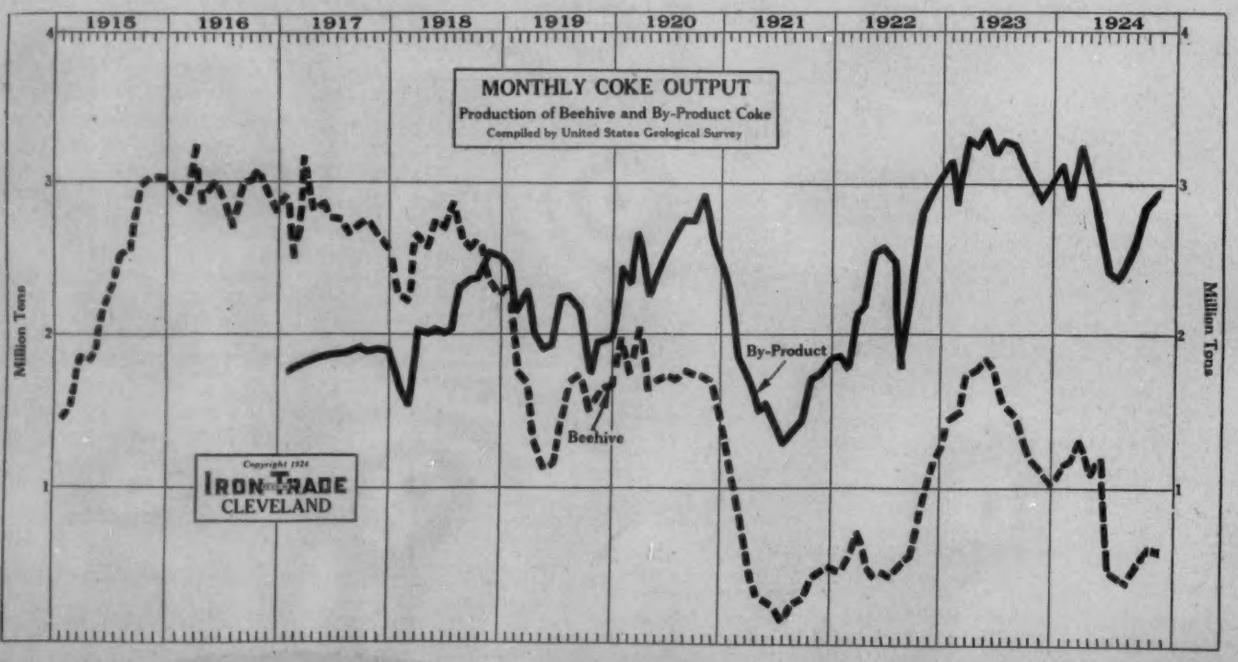


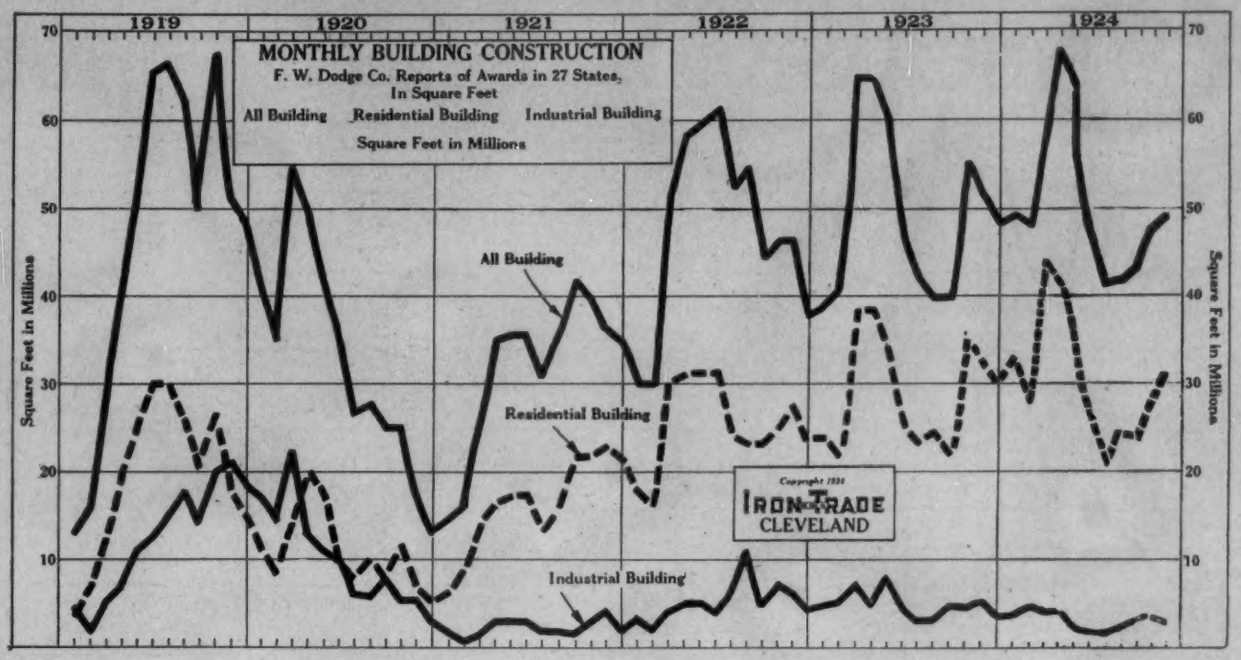
Automobile Production

THE automobile industry has applied the brakes abruptly in recent weeks to avoid winter overproduction. In November the output dropped to 222,127 passenger cars and trucks. That was the lowest production for any month since September, 1922. It was nearly 23 per cent below the total for October and 29 per cent under that for November, 1923. Compared with the peak of the year a drop of 42 per cent is shown. Aggregate output for the 11 months was 3,342,836 cars against 3,710,000 in the same period of 1923.

Coke Output

INTEREST in the coke situation has been heightened by the restoration of 1920 wage scales at independent ovens in the Connellsville district. In November, production at beehive furnaces shows a slight decline from the October total. This was due to the 30-day month, however, because the daily average rate of output was 21,000 tons in November against 20,360 tons in October. Monthly beehive output has gained 45 per cent from the summer low point. By-product production in November was 2,929,000 tons.



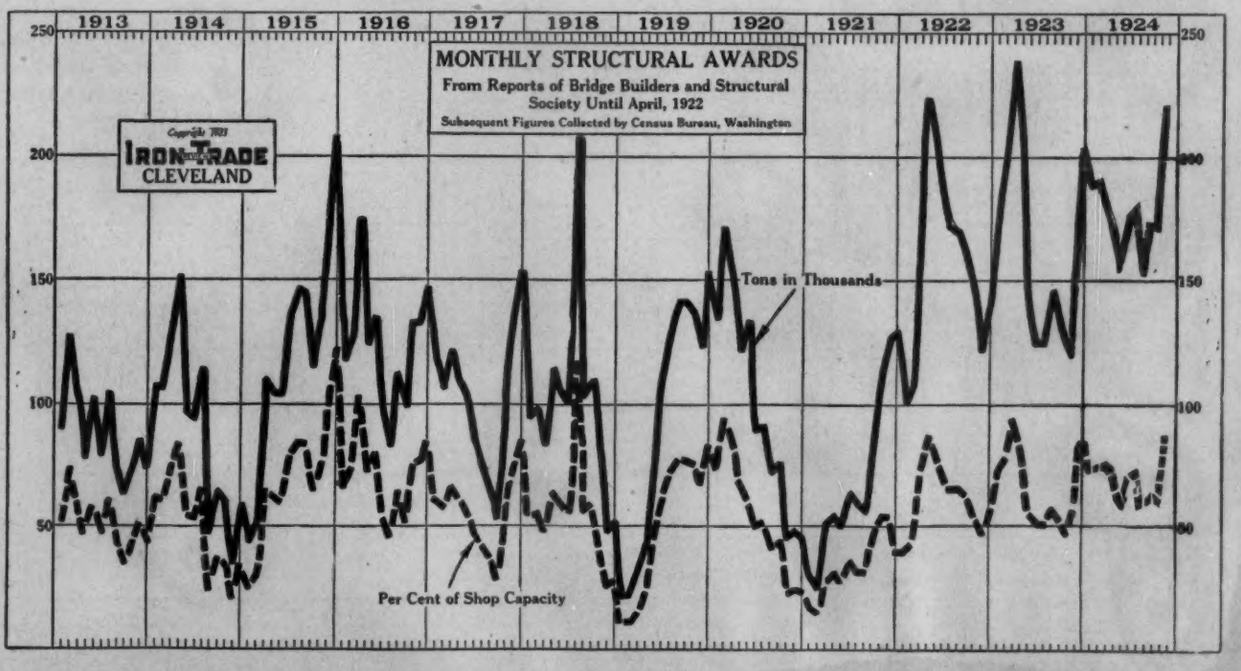


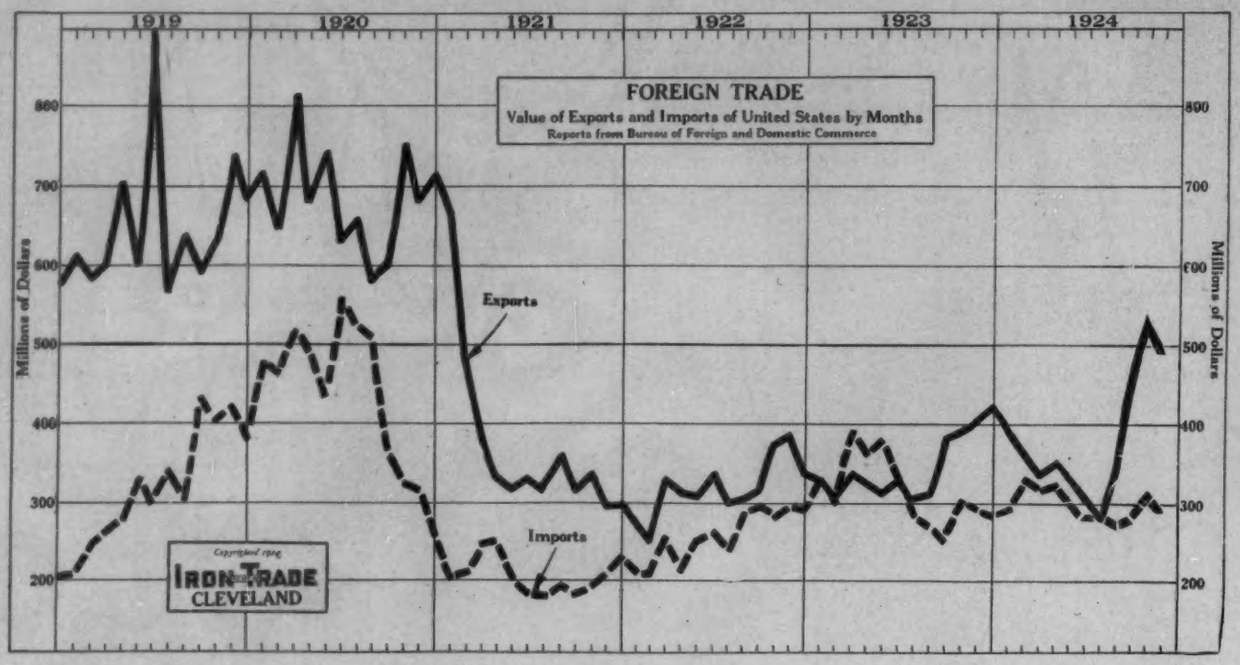
Building Construction

THE volume of building construction in 1924 is surpassing all other records. In 11 months ended with November the aggregate of awards for building in 27 Northeastern states was 558,424,000 square feet against 549,659,500 square feet in the same period of 1923. In November the volume of awards was 49,002,200 square feet against 47,489,800 square feet in October, and 52,599,500 square feet in November, 1923. The value of all awards in 11 months was $4,154,753,000, or 4 per cent above the entire 1923 total.

Structural Awards

THE construction industry has added stimulus to activities in iron and steel recently. A tangible measure of the importance of this class of buying is found in the record of structural awards for November. The total was 221,600 tons. Not in any month since March, 1923, have bookings been so great. The record compared with 171,600 tons in October and with 140,400 tons in November, 1923. The per cent of capacity represented by the awards was 85. It was 66 per cent in October and with 54 per cent a year ago.



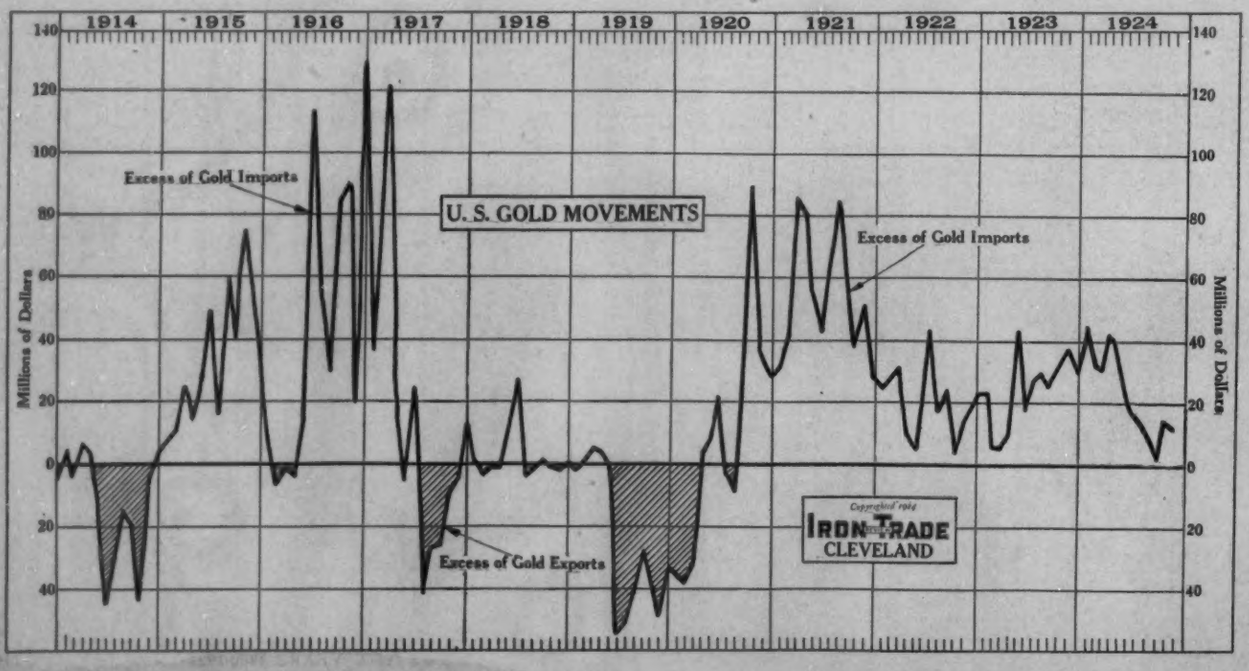


Foreign Trade

NOVEMBER brought a decline in the value of exports of American merchandise. The total was $494,000,000 against $527,232,000. With the exception of the high record for October the November total was the highest since January, 1921. Heavy outward movements of grain, of cotton and other raw materials to Europe explain the increase. Imports of $296,000,000 compare with $310,802,000 in October. For the 11 months to December exports have been $4,145,726,000 against $3,740,827,000 in the same period of 1923. The export excess was $869,053,327.

Gold Movements

AT THE rate of current exports of gold December is expected to bring the first excess of gold exports since August, 1920. In November the outflow increased and ex-exports amounted to $6,889,182, the highest since March of 1923. Imports were $19,849,000, or about one-half the average for the early months of the year. Gold is being drawn away largely by Germany, which plans to take all of its credit of $100,000,000 in gold. Reduction of the country's topheavy supply of gold lessens the inflation peril and helps Europe.



Future of Lake Ore Outlined

Depletion of Reserves of Merchantable Material in Sight, Though Heavy Investment Indicates Stability of Industry—Annual Shipment of 75,000,000 Tons in Ten Years Indicated

BY M. C. LAKE

THE future success of the iron ore industry of the Lake Superior district is dependent upon a continuous supply of its great natural resource, the iron ore. An attempt to forecast the future of the industry involves many unknown factors, and it is difficult to obtain the proper perspective of the various aspects of a situation which is so complicated with many speculative features.

The rate of growth of iron mining in this district from the beginning to its present magnitude is an especially interesting study, because it has been phenomenal. Mining on an important scale started in a region of almost unknown wilderness but a generation ago, and its rapid expansion has caused a development of the district at a rate which has even exceeded the optimistic opinions of many of the early pioneers.

With the increase in population in the mining districts modern cities have sprung up at the producing centers which have the appearance and character of permanence and stability. The heavy investments in the mines, in the railroads and boats for hauling ore, in the docks at both upper and lower lake ports, and in the furnaces and steel mills dependent upon Lake Superior ore, indicate that capital has faith that the iron ore mining industry of the Lake Superior district has a secure and lasting future, and the tendency will be to maintain the prestige the district now enjoys as long as it is economically practicable and profitable to do so.

The history of many of the mining districts of the United States relates how they were started with a boom as prospectors rushed to join in the hunt for ore. As mines were developed, the camps became established communities and a position of importance was maintained until the search for additional tonnage to replace the diminishing reserves became a losing game. As production declined, and one by one the mines closed, business languished and the camps became deserted when the prospectors, the operators and the army of followers moved to new districts to sustain production and continue operation.

The mining of ore bodies is a selective process. When the characters of the ores change to such an extent that they are no longer merchantable, or the costs of operation are too great to permit a profit, production must cease, and the business is transferred to another location more favorably suited to meet competition. Depletion of ore reserves is an ever pressing and important problem of the mining industry. Reserves are wasting assets, for the tonnage that is mined disappears and never returns. The search for new ore bodies and the research to determine new methods of treating the material left behind by the selection of high grade ore must be continuous. It is pertinent to consider what effect the depletion of reserves will have on the future of the industry.

Ore was first discovered near Negaunee in 1844, and shipments began from the Marquette range in 1854. The Menominee district started shipments in 1877. The Gogebic and Vermillion ranges began shipments in 1884; the Mesabi range and the Mayville district in 1892; the Baraboo district in 1904; and the Cuyuna district in 1911. Production to date, and for the year of 1923, from these various districts are as follows:

	Total shipment to Jan. 1, 1924	Shipments 1923
Marquette	144,246,293	3,891,801
Menominee	137,569,145	4,855,370
Vermillion	45,546,501	1,278,684
Gogebic	140,939,515	6,579,730
Mesabi	644,022,049	41,806,230
Cuyuna	18,056,368	2,220,733
Mayville	1,942,717	111,460
Baraboo	556,061	27,340
Totals	1,134,878,649	60,771,348

The accompanying chart shows graphically the tonnages produced from the Lake Superior district since 1900. The production curve has an average rise, though the yearly increase is interrupted by a series of declines.

The extraordinary demand of the war

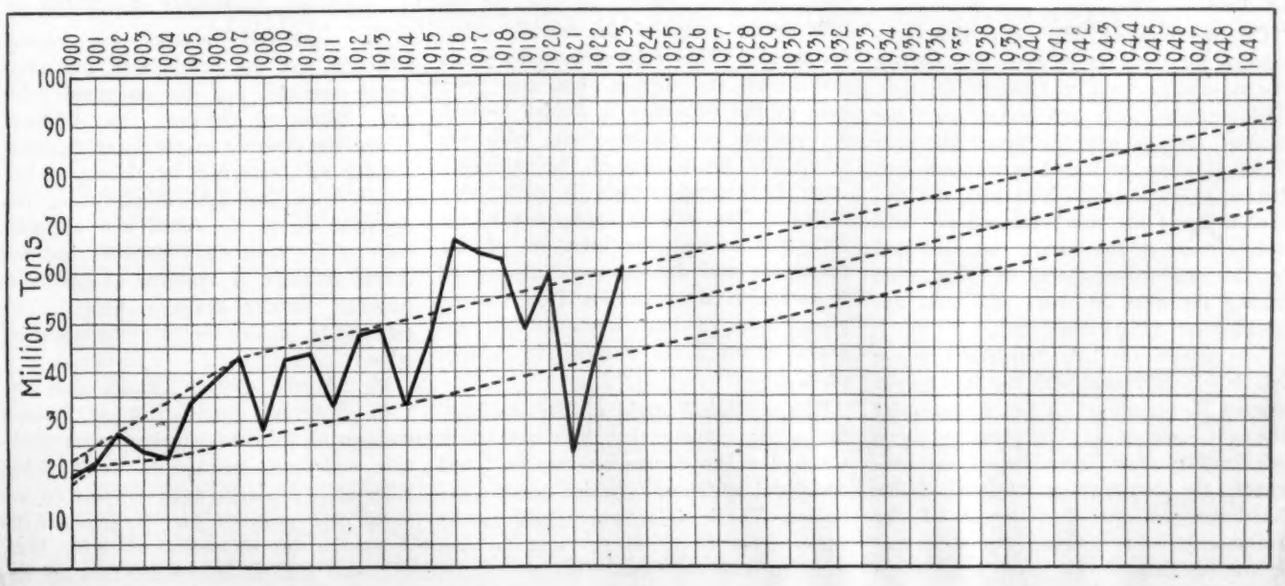


DIAGRAM SHOWING IRON ORE PRODUCTION OF LAKE SUPERIOR DISTRICT FOR THE YEARS 1900-1923 INCLUSIVE WITH EXTENSION OF AVERAGE CURVE TO INDICATE POSSIBLE FUTURE PRODUCTION

The author is geologist, M. A. Hanna Co., Duluth, Minn. The article was prepared for the Lake Superior Mining institute.

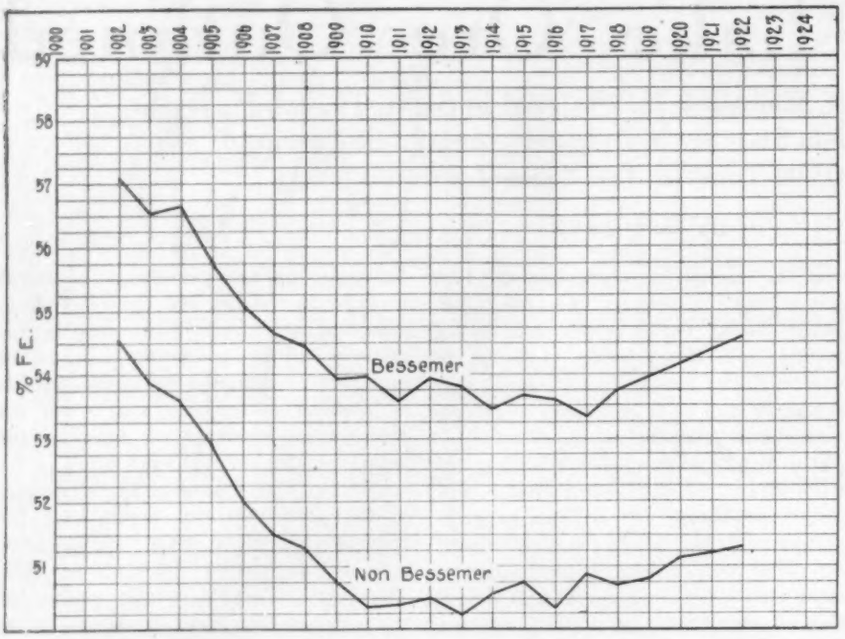


DIAGRAM SHOWING THE COMBINED AVERAGE ANALYSIS OF NATURAL IRON CONTENT OF CUYUNA, MESABI, VERMILLION, MENOMINEE, GOGEBIC AND MARQUETTE DISTRICTS, MANGANIFEROUS, LOW GRADE AND SILICIOUS ORES NOT INCLUDED

years and abnormal depression of 1921 caused erratic conditions, but it is evident that production of iron ore from the district has been increasing rapidly. How long or how fast this increase will continue, no one can say with certainty, but if the history of the past is used as a means of studying the future, and a line representing a mean of the lines joining the maximum and minimum points is projected on into future years at the same rate of increase that production has grown in the past, the diagram indicates that the district will be called upon to maintain an average production of at least 75,000,000 tons per year by 1944.

On the basis of this assumption, production for the next 20 years will deplete the reserves, a total of 1,280,000,000 tons. The average yearly production from the district for the past ten years has been 51,048,415 tons, and if it is assumed that future average productions will not exceed the past ten years' demand and will not increase at the future rate indicated by the production curve, the production during the next 20 years will total approximately 1,000,000,000 tons.

The market for Lake Superior iron ore has rapidly increased with the tremendous demand for steel which has accompanied the development of that country as a whole. The great expansion of the railroads, the construction of steel frame buildings and the development of the automobile industry have caused an accelerating demand for iron ore. It is doubtful whether such an increasing demand can continue. It is certain that the industry, both at the mines and mills, is overdeveloped at the present time, and it will take time for business to catch up with the ability of the industry to produce.

The occurrence of iron ore in the Lake Superior district is accounted for by the fact that in the area adjacent to the lake there occurs an unusual and peculiar rock called iron formation, which although varying in composition and character in some detail in the various districts as to its mineralogical content, chemical composition and associated rocks, is nevertheless principally composed of iron oxide, or iron carbonate, and silica. These rocks are pre-Cambrian in age and belong to the group of the world's oldest formations. They outcrop in many places throughout the district, but the great bulk of the formation is hidden beneath a covering of glacial drift, with the result that the tracing of the extensions from known occurrences is often very difficult. The striking appearance of the formation invited the attention of the prospector and the discovery of ore led to extension of exploration from the explored belts of iron formation into the areas where it is covered by glacial drift.

The geological study of the iron formation has taught that here and there within the iron formation may be found occasional enrichments which are the ore bodies. The iron formation itself usually varies from 25 to 40 per cent in iron, with an average content of perhaps 30 per cent iron. The silica will vary from 35 to 50 per cent. When under peculiar structural conditions caused by fracturing, folding or igneous intrusions, these beds of iron formation are attacked along particular channels of flow by the movement of meteoric water, iron ores are sometimes developed in enriched portions of the rock mass. The elimination of the silica by leaching with its consequent removal in solution, and the leaching of some iron compounds from portions of the formation, and their re-precipitation as iron oxide as a secondary enrichment in special favorable positions in the formation, effect a change of the character of the iron formation from a low-grade rock to a deposit of iron ore.

With the discovery of the Mesabi range tremendous tonnages of iron ore were found relatively close to the ledge surface. As many of these deposits occur immediately below the glacial drift, they are to a large extent susceptible to the less expensive methods of open pit mining, and it was this type of development which brought the Lake Superior district so conspicuously to the front as the greatest iron ore producing district in the world.

The Mesabi range has been thoroughly prospected. The reserves of high grade ore are definitely known, and it is generally admitted among men best acquainted with the Mesabi range that little additional high-grade ore is likely to be found in addition to that already known in that district. The ore reserves of the remaining districts of the Lake Superior region are not so definitely ascertained as the ore bodies are irregular and occur at depths varying from ledge surface to known depths of over 2500 feet in the steeply dipping beds of iron formation, and under conditions which are complicated to understand and difficult to outline.

Reserves Accurately Estimated

The developed reserves are known, however, and the possibilities for additional tonnage can be estimated with some degree of certainty. An estimate of the ore reserves of the Lake Superior district was compiled by the Lake Superior Iron Ore association, under the direction of R. C. Allen, and his estimate is the most comprehensive and accurate estimate of reserves of the Lake Superior district available today. The estimate is shown in the accompanying table.

Mr. Allen's estimate shows that the Lake Superior district has an assured tonnage of 1,560,505,305 tons and a probable additional tonnage of 1,368,719,800 tons, or a combined total tonnage of assured and probable ore of 2,947,225,108 tons. If the shipments of 1920, 1921, 1922 and 1923 of 187,988,270 tons are deducted from the tonnage of assured ore, the total assured tonnage is 1,372,517,035.

The Michigan geological survey estimated Jan. 1, 1923, that the reserves for the various counties of Michigan on that date were as follows:

Marquette and Barago county	72,102,521
Cogebic county	58,314,512
Iron county	57,065,508
Dickinson county	9,344,407
Total	196,826,948

This estimate shows a slight decline over the assured tonnage of Michigan estimated by Mr. Allen in 1920.

The future mining of ore will rapidly deplete the reserve of assured ore as known today. If the production continues to increase at the rate it has in the past, the assured life of the industry is good for about 21 years. If on the other hand, the production does not increase, but maintains the average of the past ten years, then the assured life may be extended about six years longer. With an assured life of only 21 to 27 years ahead of the industry, and an additional probable life of perhaps 20 years more, which would consume the 1,368,719,800 tons of probable ore, it is a certainty that the next few years will show an increasing interest in ways and means to substantiate and extent the assured life of the industry and prove up the tonnage now considered probable and possible.

This problem ahead of the Lake Superior iron industry of extending its assured life is partly a geological one and partly a mechanical one. Both methods of attack are controlled by the practical economic factors, markets and competition. The location of the mining districts close to Lake Superior with convenient economical transportation to the densely populated consuming centers of the industrial districts is a valuable asset in a competitive market with other ores. But even with this great advantage the products manufactured from the Lake Superior district ores are gradually being controlled by a more restricted market.

The development of the Birmingham district, of Alabama, has progressed to a condition where it is expanding its market. The magnetite deposits of New York, New Jersey and Pennsylvania are important reserves of iron ore and insure long life to the use of that ore at eastern furnaces. Developments at Salt Lake City, Pueblo and St. Louis tend to restrict and curtail the consumption of Lake Superior iron ore products in the West and Southwest. The importation of steel products from Europe and of foreign ores from Europe, Africa, Cuba and South America will probably gain a stronger foothold on the eastern seaboard. Construction of the St. Lawrence waterway-to-the-sea will place the Lake Superior iron ore district in direct competition with foreign ores from Wabana and other districts at the lower lake ports. Canada is making strenuous efforts to develop an iron mining industry, and if she is successful in her investigation, there will be a diminishing demand from her for Lake Superior iron ore, pig iron or finished steel products.

Canada imports annually from the United States large tonnages of iron ore and iron and steel products. The Ontario government appointed a committee last year to investigate the matter of iron ore resources in the province to determine whether or not it would be possible to develop raw material of their own. The members of this committee after careful investigation have reported to the minister of mines that they believe there are possibilities for development of ore in the province, and they have recommended to their government that a bonus of 1 cent per unit up to 50 units be paid for all ore produced in the province during the ten years following the establishment of the act. Their recommendation indicates their knowledge of the diminishing supply of ore from the United States that might be available for their furnaces, and they have inspired the idea that an iron ore industry properly encouraged and stimulated in its early stages of development can grow to be self-sustaining and become an additional source of wealth to their country.

The average costs of mining ore in the Lake Superior district are more apt to increase than decrease, for as the open pit mines are exhausted and greater bulks of the tonnages mined must be removed by underground methods, the costs will increase as depths of mining increase. With greater productions coming from underground, there will be an increase in the use of timber which is growing more scarce each year, with a resulting rise in cost. Power costs will increase as the mines deepen and extend the height to which water must be pumped and the ore hoisted. Greater initial investments will be required for exploration, development, shafts and equipment. Taxation is rising at an alarming rate and is tending to restrict the natural growth of the business. High royalties and excessive freight rates are important factors affecting costs and distribution of ore and manufactured steel products. The increased cost of mining and transportation will be reflected di-

Iron Ore Reserves in Lake Superior District

MINNESOTA—	ASSURED ORE Bessemer tons	ASSURED ORE Non-bessemer tons	ASSURED ORE Total Assured tons	PROBABLE ORE Bessemer tons	PROBABLE ORE Non-bessemer tons	PROBABLE ORE Total Probable tons	GRAND TOTAL tons
*Mesabi Range.....	330,431,666	938,634,349	1,269,066,015	99,129,500	281,590,300	380,719,800	1,652,785,815
**East Mesabi.....	.....	.....	.....	300,000,000+	.....	300,000,000+	300,000,000+
***Vermillion Range...	15,000,000	Negligible	15,000,000	15,000,000	Negligible	15,000,000	30,000,000
****Cuyuna Range	Negligible	55,846,435	55,846,435	Negligible	100,000,000	100,000,000	155,846,435
Total.....	345,431,666	994,480,784	1,339,912,450	414,129,500	381,590,300	780,719,800	2,138,632,250
‡WISCONSIN—							
Gogebic-Florence-Mayville-Baraboo.....	2,500,000	19,000,000	21,500,000	15,000,000	41,000,000	56,000,000	77,500,000
‡‡MICHIGAN—							
Gogebic range.....	14,384,638	50,178,365	64,563,003	70,000,000	180,000,000	250,000,000	314,563,003
Marquette range.....	8,504,258	62,129,111	70,633,369	15,000,000	100,000,000	115,000,000	185,633,369
Iron River-Crystal Falls.....	.....	54,632,863	54,632,863	.....	150,000,000	150,000,000	204,632,863
Menominee range.....	2,115,811	7,147,809	9,263,620	2,000,000	15,000,000	17,000,000	26,263,620
Total.....	25,004,707	174,088,148	199,092,855	87,000,000	445,000,000	532,000,000	731,092,855
Grand Total	372,936,373	1,187,568,932	1,560,505,305	516,129,500	867,590,300	1,368,719,800	2,947,225,108

*Assured ore Mesabi range based on estimate of Minnesota tax commission. R. C. Allen adds 30 per cent for probable ore.
**East Mesabi magnetite concentrates above depth of 50 feet in present explored area by W. G. Swart. Also quoted in IRON TRADE REVIEW.
***Assured and probable ore by R. C. Allen.
****Assured ore by Minnesota tax commission. Probable ore by R. C. Allen.
‡By W. O. Hotchkiss, state geologist of Wisconsin.
‡‡Assured ore is estimate by Michigan tax commission of "Developed and Prospective" ore. Probable ore by R. C. Allen.
Dr. C. K. Leith estimates for Gogebic in addition to "Present Reserves" 250,000,000 tons above 3000-foot level.
Silicious ores not included. Bessemer and non-bessemer ores include present commercial grades.

rectly in the increased cost of iron and steel products, and will affect the distribution and tend to curtail the expansion of the demand for Lake Superior iron ore in competition with ores and iron products from other districts. Additional tendencies toward restrictions of demand for ore will be due to the increased melting of scrap iron and steel products.

Ore prices reached the peak in 1920 with an abnormal demand and are now falling in keeping with the present general over-development of the industry. These competitive factors of the trade will tend to diminish the accelerated demand for Lake Superior ores, tend to lengthen the life of the business, and restrict the expansion which has been the history of the business in the past, unless new deposits of ore of good quality which can be economically mined can be found, or economical methods of beneficiating low grade deposits be developed which will permit it to survive and persist as an expanding industry

The accompanying diagram of the combined average of natural iron content of ores from the principal ranges for the Lake Superior district is presented to show that there has been a gradual decline in average grade of ore shipped up to 1910, but that since that time the quality of ore shipped has been maintained with a slight advance since 1917 over the previous seven years. It is indicated that the trade has determined that the shipment of low grade ores except those used for mixing or special purposes is not profitable to either the mining companies or the furnace operators. The tendency of the recent past has been to maintain the quality of ore grades by methods of beneficiation of low grade ores to make them merchantable. As the tonnages of higher grade ore are depleted this tendency to expansion of methods of beneficiating ores will undoubtedly become more and more important.

Increase in Beneficiation

The past ten years have seen the development on an important scale of the problem of the beneficiation of iron ores. The washing plants on the western Mesabi and the Cuyuna ranges have made merchantable the loose, sandy, low grade reserves of those districts. Drying plants on the Mesabi, Cuyuna and Gogebic ranges have beneficiated and made merchantable reserves of high moisture ores. The tonnage of beneficiated ore in Minnesota, according to state reports, has increased from 2,119,838 tons in 1914 to 8,432,007 tons in 1923.

Changes in furnace practice have made merchantable manganiferous ores of the Cuyuna, and the use of some high phosphorus ore in steel making is increasing the demand for high phosphorus ores of the Iron River and Crystal Falls districts. Research, such as that carried out by Prof. R. S. McCaffery, at the University of Wisconsin, in demonstrating the possibilities of smelting of high sulphur ores by the adaptation and control of special slag mixtures, will increase the demand for high sulphur ores, of which there are important tonnages in the Crystal Falls, Iron River, Florence and Marquette districts. The careful mixing of ore of different grades and structures has increased the total reserve of merchantable ore by carefully controlling the mixture of some of the good ore with some of the poor. Careful engineering and geological work is reducing mining losses and finding new deposits of ore adjacent to existing developments. These introductions into the business of iron ore mining tend toward conservation of the known reserves and extend the life of the industry.

Are Extracted from Rock

The development of the Mesabi Iron Co., at Babbitt, is the beginning of a new phase of the business. The utilization of low grade magnetite ores not heretofore considered valuable and their conversion from a low grade rock to a merchantable ore is now an accomplished fact. Such developments will add to the life of the district. There are many localities in Michigan, Wisconsin and Minnesota, where large deposits of iron formation averaging 40 per cent in iron principally in the form of hematite, are available for concentration. These deposits probably represent the great bulk of the future reserves of the Lake Superior district and are awaiting the development of an economical method of treatment suitable for conversion of the rock to a high grade ore

The laboratories of the bureau of mines and of the mining departments of the Universities of Minnesota and Wisconsin are conducting important investigations relative to the problems of beneficiation of iron ores not merchantable in their natural condition. Their work will play an important part in the development of methods of beneficiating iron ores at the mines and will assist in the determination of more suitable methods of treatment at the furnaces.

The state geological surveys of Minnesota, Michigan and Wisconsin, working under the direction of their state geologists, and the United States geological survey working under the direction of C. R. Van Hise, made a careful geological survey of the Lake Superior district. The results of their work are extraordinary, particularly when it is realized what a large area has been studied thoroughly in spite of great hardships in a wild, undeveloped country without adequate transportation facilities. These men performed an important service and their work has been invaluable to the development of the Lake Superior district. The early work of the United States geological survey was later summarized by Van Hise and Leith, in Monograph LII, in 1911. Since that time the United States geological survey has not been active in further work in the Lake Superior district, but the state geological surveys of Michigan, Wisconsin and Minnesota have done some work of mapping in more detail particular areas which needed more thorough study. R. C. Allen and L. P. Barrett, of the Michigan geological survey, have added important information to the geology of the Iron River district, the eastern Gogebic and scattering areas between these districts. The Minnesota geological survey has made preliminary studies of the Cuyuna district and reports have been published regarding the geology of the Gunflint district, the magnetites of the Duluth gabbro and other subjects of geological interest.

The Wisconsin geological survey has been the most active of the state surveys in recent years and has endeavored to determine the possibilities of the undeveloped areas of northern Wisconsin. According to the thirteenth biennial report of the commissioners of the Wisconsin geological survey at the close of 1922 a total of 206½ townships had been surveyed during the years 1913 to 1922 inclusive. The appropriation of the Wisconsin survey for mineral land classifications has amounted to from $10,000 to $15,000 per year, and they have maintained at least two field parties for this work. At present they are devoting their time principally to the copper possibilities of northern Wisconsin. They have mapped the western Gogebic and Florence districts in detail. Their publication, Bulletin No. 44, is a compilation of the results of much of their work and is valuable for aiding the prospector in selecting areas most likely to contain iron formation.

More Information Needed

The work in the Florence district was done about 1911. The work on the western Gogebic was done in 1915, and to date the results of this work have not been published, except through preliminary maps. Work of this sort to be truly valuable should be published as soon as possible after the work is completed.

The appropriations granted to the state surveys of either Michigan or Minnesota are not sufficient to carry on work of the character conducted by the Wisconsin geological survey.

The iron ore industry is interested in the geology of its district. It needs to know a great deal more about it than is known today. The general preliminary work has been done, but the future de-

mand for cheap ore makes it imperative that more detailed work be done to aid in the discovery of new belts of iron formation and their hidden deposits of iron ore.

Few New Discoveries Made

Few new deposits of ore have been discovered in the past ten years. The additions to the assured reserves have nearly kept pace with the mining during recent years through extensions of known deposits and the proving up of what is carried on the estimate as probable ore. The lack of new discoveries is partly due to lack of demand for additional ore because of the temporary over-development of the industry, and the excessive taxation of ore reserves in the ground, making them a liability rather than an asset to the owner and partly due to the fact that the most readily discovered deposits have probably been found. The effects of overdevelopment and taxation have greatly diminished the amount of exploration for ore until today there are but a few diamond drills working as against scores years ago.

Careful geological work is the necessary prerequisite to intelligent prospecting. This fact is recognized by most mining companies, and the conduct of mining operations is being guided more and more by the results of careful geological study. The search for ore is expensive and tedious, and it is especially important that all facts regarding the occurrence of ore bodies and their relations to the structure of the formations be recorded as work progresses that proper interpretations may be made for further prospecting. The task of the geologist is primarily that of eliminating the unfavorable areas for exploration and conducting the prospecting in the favorable localities at a minimum of expense.

A great deal of geological field work still remains to be done in the Lake Superior district, and this work can be most conveniently and properly done by the state geological surveys of Minnesota, Michigan and Wisconsin. It is especially important that the geological work be carried on continuously for the accumulation of more detailed information regarding the geology of areas likely to contain ore. A larger percentage of money secured by the state from its mineral resources should be put to use in maintaining those sources of wealth which are fundamental to the prosperity of the country. Each of these states maintains a geological department with able state geologists, and the state and the industry should be interested in seeing that they have the use of a sufficient amount of the revenue to permit them to expand the geological work over their various fields. The information regarding the various mines should be correlated and kept as up to date as possible. In the Cuyuna, Florence, Iron River and Crystal Falls districts much of the iron formations is covered by glacial drift and the extensions are difficult to determine without expensive explorations. As much knowledge as is possible to secure from a geological study of the districts should be available to the prospector so that the work can be economically conducted and without useless duplication of work possibly indicated by the results of some previous exploration. There are large areas of territory north and west of the Cuyuna district of Minnesota which would justify careful field magnetic surveys, as isolated patches of iron formation have been discovered in that area distant from producing mines, and efforts should be made to determine the possibilities of this region. North of the Mesabi and west of the Vermillion range magnetic lines have indicated the presence of iron formation of the Vermillion type and this field is worthy of careful field work.

The iron formation of the Gogebic district probably dips down somewhere in northern Wisconsin, and the areas where it is most likely to occur need to be studied in detail. The areas of Huronian rocks for a radius of 25 miles around the Crystal Falls and Iron River districts justify careful study. There are many problems of very important economic interest in each of the producing districts and if these could be carefully studied by the state geological surveys much value could be gained. The recent work of J. F. Wolff, regarding the detailed geology of the Mesabi range, and that of W. O. Hotchkiss on the Gogebic, has been very useful in indicating the relationship of certain beds of the iron formation to the iron ore. The studies of L. P. Barrett, of the Michigan geological survey, have indicated many new features regarding the Menominee district which are very important in indicating that faulting has played a very prominent part in controlling the concentration of ores in that district. This work is still incomplete and has not been published.

Many Problems to Solve

Additional information is needed regarding means and methods of correlating slate and iron formation horizons of the mines and explorations of the various districts and their relationship to ore bodies. The question of possibilities for ore with depth is becoming increasingly important and is a vital subject today involving the future of many mines. The relationship of the character of mine water to concentration opens a method of attack upon this problem, and research should be conducted to determine whether a study of the analysis of deep mine water may be a means of establishing certain conclusions which would be valuable criteria in anticipating conditions in advance of development.

State Can Work Best

The spirit of co-operation and the kindly attitude toward exchange of ideas regarding the geology of various properties among the mining companies is excellent, and progress is made by such exchange which is of mutual advantage for the broader understanding of geological problems. This friendly feeling is beneficial and co-operation should be developed as far as possible within its scope of practical application, but no one company or group of companies is in a position to carry on a comprehensive study of the geology or to conduct a program of research touching on the geological problems over an extensive area in as thorough a manner as the work could be done by the state surveys with their authority to collect all information important to their problem If this work began today it would be years before the careful field work which would be necessary to cover in a comprehensive manner the areas favorable for additional possibilities could be completed and the results correlated. The preparation and publication of more information relating to the geology of individual ore deposits by men associated with their development would be an aid to advancement of the knowledge of iron ore deposits. The geological information regarding every deposit is important as each is a problem by itself. The tendency to generalize and fit a broad theory to a variety of conditions can be over-emphasized, and conclusions based on the assumptions controlled by broad interpretations may be misleading. The more detailed facts there are available, the better can explorations be guided for the discovery of new deposits.

The security of the future of the district with its diminishing ore reserves and increasing costs depends upon the results of an expanded exploration program to determine the extensions of ore bodies in depth, to locate new deposits within known occurrences of iron formation, and to discover new iron formation ranges. The logical preliminary step toward the undertaking is the acquiring of a more complete and better understanding of the geology of the district as a whole, so that explorations for high grade ore bodies and deposits of ore which may be beneficiated economically can be conducted efficiently.

The stack of the Chateaugay Ore & Iron Co., Standish, N. Y., is undergoing repairs of a general character.

Loose Rolling Gains Favor Among Sheetmakers

Youngstown Company Installs New Eight-mill Plant for Manufacture of High Grade Automobile Sheets

BY JOHN D. KNOX

Fig. 1—Front end of a sheet furnace showing the heater withdrawing a partially rolled sheet. All pair and sheet furnaces are fired with coke oven gas

A REPRESENTATIVE of a manufacturer of high-grade sheets sent his card in to the purchasing agent of a large maker of automobiles in Detroit and later was ushered into his presence.

"I thought I might interest you in some sheet tonnage for delivery in about six or seven weeks," the salesman said after an exchange of greetings. "We've never used any sheets made by your company," the purchasing agent replied. "What method does your company use in rolling?" "We make our sheets by the tight rolling process," said the salesman. "But why are you so interested in the method of rolling as long as the sheets pass your inspection?" "That's it. The sheets won't pass our particular inspection and we have found the difficulty lies in the method of rolling. I'll tell you

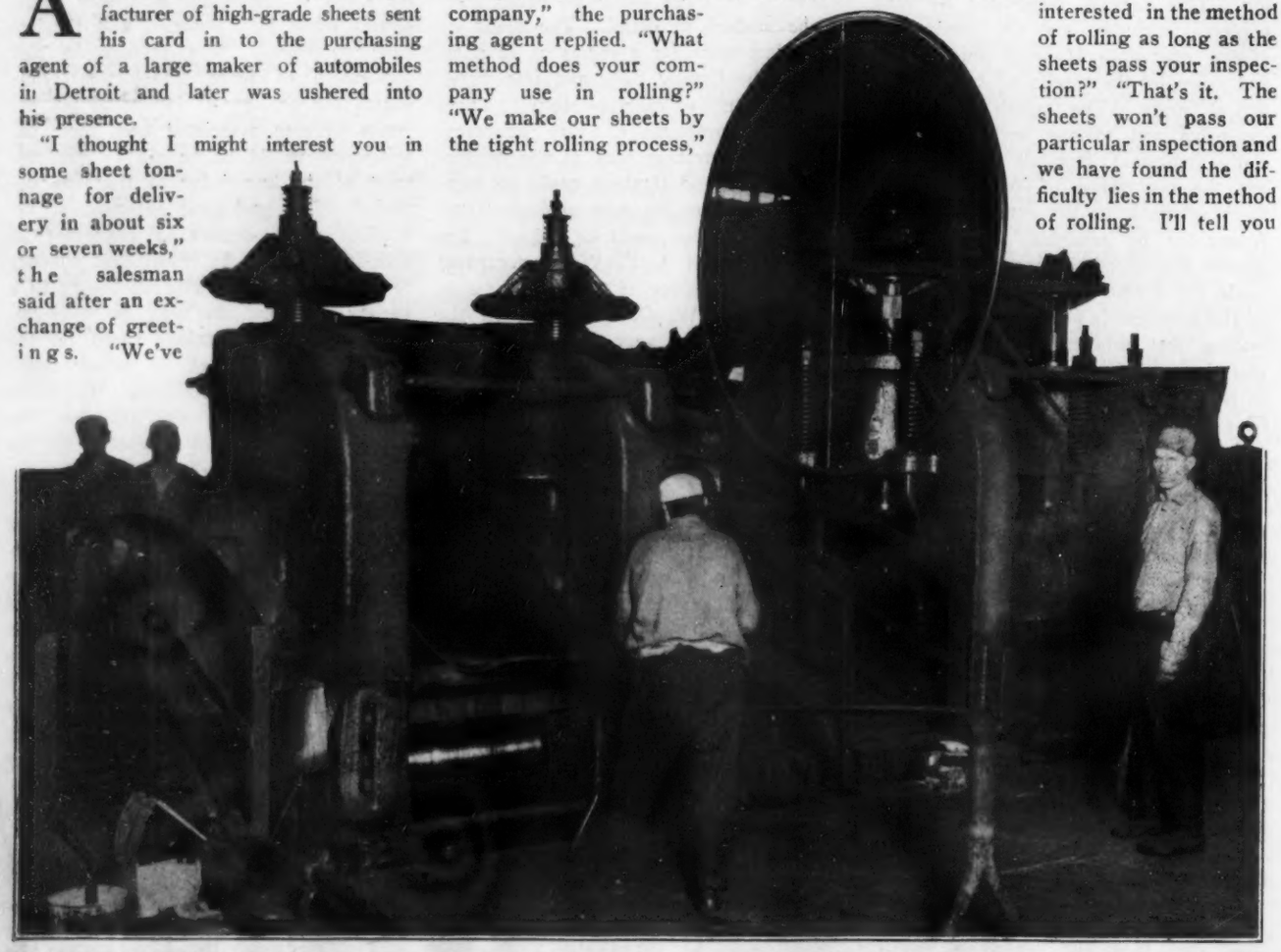


FIG. 2—REAR SIDE OF MILL SHOWING CATCHER PASSING A PACK OF SHEETS BACK OVER THE TOP ROLL TO THE ROLLER. THE STAND OF ROLLS TO THE RIGHT, EQUIPPED WITH A LARGE HAND WHEEL IS KNOWN AS A BALANCE ROUGHING MILL. THE TOP ROLL IS SUPPORTED BY THE SPRING ARRANGEMENT SHOWN AT THE SIDE OF THE HOUSING

what I tell every sheet salesman who steps over my door mat. Whenever your company decides to adopt the loose rolling method, then it will pave the way for you and me to do business. But until then every minute you spend endeavoring to get our business is wasted. I say this in all due respect to your sales ability."

"What is this loose rolling process to which you refer and how extensive is it used in this country," asked the salesman.

"I'll answer your last question first. Practically every manufacturer of high-grade sheets in this country today is turning out his product by the loose rolling process. Probably not because they want to but because they've got to if they want to cater to the trade. Consumers of this grade of material are becoming more and more exacting in their surface inspection and drawing qualities of the steel, as you know, and their requirements cannot be met satisfactorily by the tight rolling process. Perhaps you can recall an old-established mill trying to execute its high finished orders by the tight rolling process but which was obliged to turn to loose rolling to retain its customers. And your company is faced with the same problem. It isn't any of my business if your company wants to tight roll but it is my business to see that we get sheets into our warehouse that have a high planished surface and at the same time will withstand the various forming and deep drawing operations."

"I don't want to interrupt your line of thought," said the salesman, "but why have sheetmakers, and I might just as well include my company, been so backward about adopting this loose rolling process?"

"Well," said the purchasing agent, "a maker working off his tonnage by tight rolling doesn't have to pickle the breakdowns, nor does he have to pay much attention to the finish. He can put an order through his mill in 10 days whereas six weeks are required to get an order through a high-grade mill loose rolling its tonnage. Of course the output per turn when tight rolling, is larger than when the loose rolling method is employed. The term 'loose rolling' was derived from the fact that the sheets are rolled loosely. That is, before making up the three sheets into a pack, or, matching as the operation is called, the middle sheet is dipped into a solution of charcoal and water."

"What's the purpose of the charcoal?" asked the salesman.

"To facilitate the separation of the matched sheets before shearing and, thereby, favor a better pickled finish later," replied the purchasing agent. "You see when the sheet leaves the dope vat, as the mill crew calls it, fine particles of charcoal adhere to the surface of the steel. The sheet in this condition is placed between two uncoated sheets and the pack is placed in the sheet furnace. During this subjection to heat, the charcoal burns away leaving a slight ash which prevents the sheets from sticking together after the finishing passes have been administered. Of course between the breakdown and finishing operations and before the charcoal solution is applied, the partially rolled sheets are pickled. This step at this particular stage of reduction is omitted in the tight rolling process."

"What's to be gained by pickling the steel in the midst of the rolling process?" asked the salesman.

"It removes any dirt, scale or foreign material from the surface of the sheet and makes the charcoal solution more effective. You know the loose rolling process is nothing new, don't you? In the old days when puddle iron was used as the base metal for sheets, wet saw dust was placed between the layers prior to the finishing passes to prevent sticking. The iron sheets never were doubled. Later the bessemer and open-hearth processes of steelmaking were developed and steel gradually supplanted iron as the base metal. Someone found that sheets made from open-hearth steel could be doubled during the hot rolling stage and then finished off in packs of fours, sixes and eights depending upon the gage, without an excessive quantity of stickers, or, sheets that stick together."

"Is it because the steel is heated too fast that makes the sheets stick?" interrupted the salesman.

"Not necessarily," replied the purchasing agent. "The phosphorus content in the steel, according to comparatively recent investigations, exerts a large influence in this connection. Well, to continue, the automobile came into prominence and large tonnages of sheets began to be consumed. At first the bodies of automobiles were hand painted and we depended upon our painters to conceal any streaks, depressions or other defects commonly found in sheets in those days, that might have resulted in the rejection of the finished car. Under the whiplash of public demand for pleasure cars, automobile makers began to use enamel instead of paint as a body finish

FIG. 3—GENERAL VIEW OF THE SHEET BAR YARD. THE SHEET BARS IN 30-FOOT LENGTHS ARE CUT IN SECTIONS WEIGHING SO MANY POUNDS PER FOOT AND ARE PILED AT THE REAR OF THE PAIR FURNACES

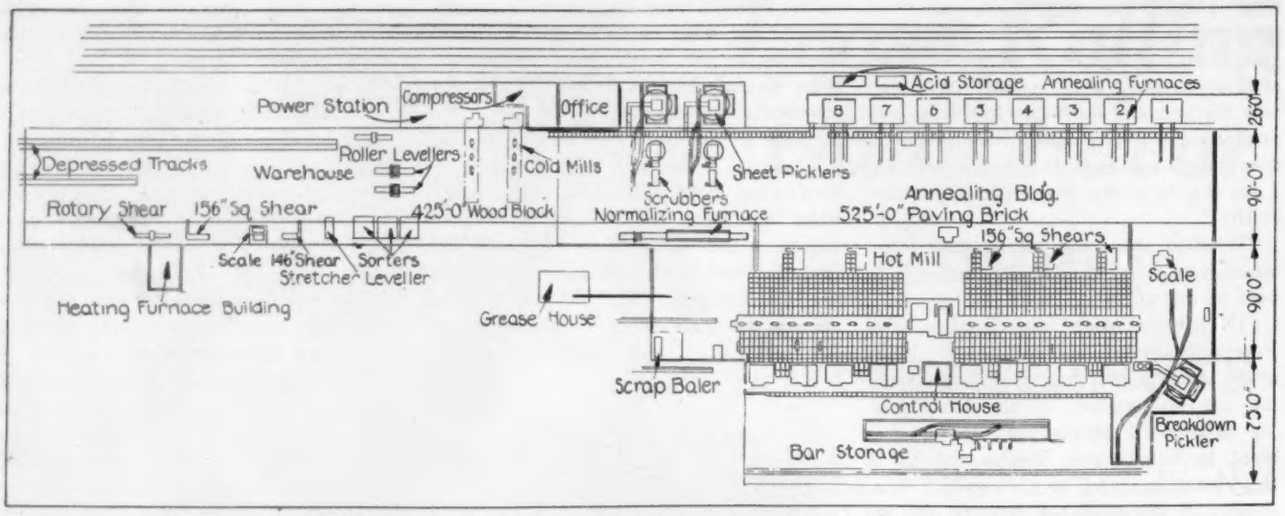


FIG. 4—PLAN OF NEW SHEET MILLS SHOWING ARRANGEMENT OF PRINCIPAL EQUIPMENT

and despite all they could do they were unsuccessful in masking the defects on the surface of the sheets. Consequently, they began to urge the mills to improve the finish.

"Someone remembered the loose rolling process employed when puddled iron was used for sheets and applied this method at his plant. Within a comparatively short period the automotive industry rushed to the doors of this plant endeavoring to get tonnage. Meeting with little success the buyers of this material turned to their sources of supply and requested tonnage made by the loose rolling process. Makers did not relish the idea of changing from tight to loose rolling because they could not turn out as much tonnage but one by one they acceded. I might add that much of the grinding, buffing and polishing work entailed in the finishing of automobile bodies is unnecessary when loose rolled sheets are used.

"So I say if your company expects to book very much high-grade sheet tonnage for automobile manufacturers in this country it will do well to investigate the method of producing sheets by loose rolling."

The foregoing conversation occurred a few years ago in a Detroit office which is considered important from the standpoint of tonnage by the majority of producers of fine finished sheets. While it is not stated word for word yet it serves to illustrate what is required to engage in the manufacture of automobile sheets.

* * *

SHEET iron was the first commodity rolled by the Youngstown Sheet & Tube Co. Six mills first were placed in operation February 1902, and during that period the raw material used was puddled iron. Since its modest beginning nearly 23 years ago this company has become the leading sheet producer in the Mahoning valley. Until this year the sheet output was confined largely to the production of the common grades. Nov. 17, however, marked the entrance of the company into the full finished sheetmaking industry when the first unit of its eight-mill plant was started on production. The new mill is laid out for loose rolling and is provided with the latest equipment for producing sheets of high finish and of various drawing qualities.

Located at the Brier Hill division, the new plant is within a stone's throw of the company's semifinishing mills. Three parallel aisles are provided in the sheet mill building. The center aisle, 90 x 446 feet, is given over to the hot

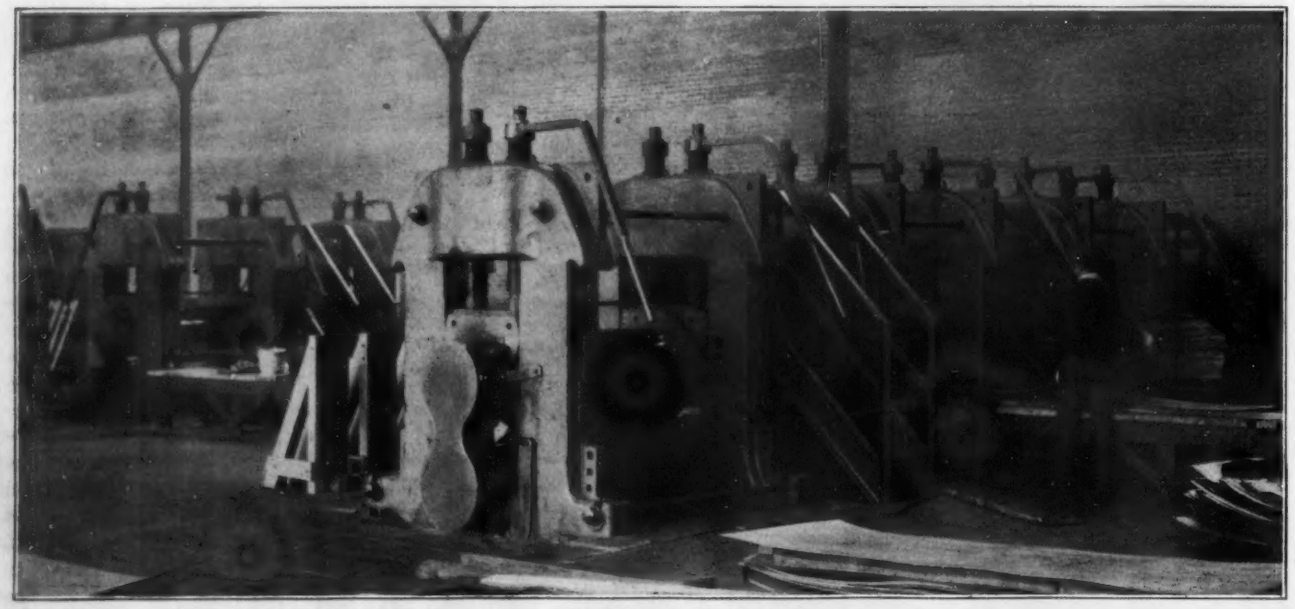


FIG. 5—SIX STANDS OF ROLLS ARE INCLUDED IN THE COLD FINISHING DEPARTMENT. THESE ARE ARRANGED IN TWO TRAINS CONSISTING OF THREE MILLS EACH. FOUNDATIONS ARE BUILT FOR ADDITIONAL MILLS WHICH WILL BE INSTALLED WHEN CONDITIONS WARRANT

mill department. West of this department is the sheet bar storage aisle, 75 x 324 feet, which also houses the sheet and pair furnaces, the control station for the mill motor and the breakdown pickler. East of the hot mill department is the finishing aisle, 90 x 950 feet, in which the progressive steps in the finishing process, such as annealing, pickling, cold rolling, roller leveling, stretcher leveling, slitting, shearing, oiling, etc., are executed.

Two leantos form a part of the finishing bay. One is 26 x 140 feet and contains a complement of eight double compartment annealing furnaces; the other is 35 x 274 feet and houses the sheet picklers, mill offices, air compressors and power station. In designing the plant consideration was given to futures expansion, and in case this is desired the center bay can be extended to house eight new hot mills and the eastern bay enlarged to provide additional storage space for semifinished material. Foundations for the necessary cold mills already are built for doubling the present complement of six stands, whenever conditions warrant.

Layout Includes Eight Mills

All gages and a wide variety of sizes of high-grade stock can be scheduled on the present installation of eight mills, or the rolling schedule can be diverted to the production of common sheets in case this is desired. The hot mill layout includes three 48-inch mills, two 44-inch and two 38-inch mills and one 54-inch unit. Seven roughing mills are of the jump type, that is, the upper roll of each is free to jump upwards as the sheet bars pass between it and the bottom roll. The roughing mill, which serves the 54-inch finishing stand, is of the balanced type, the upper roll being balanced by springs and thus held tight against its upper bearing so that it will not fall down through the thickness of the sheet bar or slab after a reduction has been made. Otherwise the lower roll would not withstand the repeated blows caused by the upper roll, weighing 6 tons or more, falling through a space varying from 1 to 2 inches.

The upper roll of the roughing mill is driven through a stand of pinions interposed in the rolling train between the roughing and finishing stands of this unit. Electrically operated screwdowns are employed for lowering or elevating the upper roll of this balanced unit. On the jump roughing mills the screwdowns are operated by a large hand wheel placed in a vertical position at one side of the housing within easy reach of the operator.

Each end of the mill train terminates in a drag, which essentially is a split bearing lined with wood and which imparts friction to the driving spindle. The amount of friction is regulated by varying the spring tension on the upper half of the bearing. The purpose of the drags is to prevent backlash of the rolls and while approximately 100 horsepower is required merely to maintain this friction, still no other means has been devised which will control the backlash and permit elimination of these power consuming drags from the mill train. A 2000-horsepower motor is interposed in the center of the hot mill train and drives the 16 stands of rolls through a set of reduction gears.

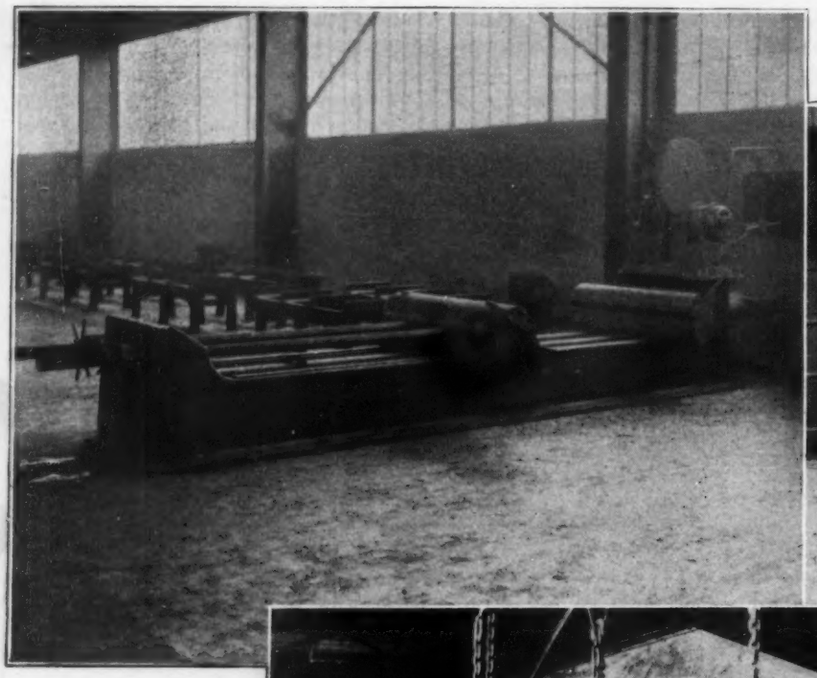
That thought was given to the importance of atmospheric conditions throughout the mill is evident on very hand. Each finishing mill standing is covered with subway grating to provide additional ventilation for the comfort of the workmen. A motor-driven turbo fan is installed at the end of the hot mill building. This takes air from the outside and forces it through an underground duct to various offtakes which terminate in adjustable funnels at each stand of rolls. During the hot weather months these funnels are set to direct the cool blasts of air on the workmen as they perform their duties. Additional ventilation is provided in the hot mill building through a row of windows along each side of the monitor-type roof. Each row is opened or closed to any desired angle by a 5-horsepower motor controlled by a push button at floor level. The sheeting used on the roof over the hot mill and annealing departments is protected with asbestos, while the warehouse is roofed with wood. The purpose of using these materials for roofing is that they will not sweat easily and, therefore, no condensed globules of water is likely to blemish the surface of the sheets while the stock is being processed or while waiting shipment. A service building separate from the sheet mill structure now is being erected and will be equipped with lockers, showers, etc. to serve 500 workmen.

Sheet bars in 30-foot lengths are brought into the bar storage yard in standard railroad cars. The track is laid along the western side of the building, and, running its entire length, permits piling the semifinished material at the shear or on steel piers located at various points in the building. The sheet bars are transferred from the cars or from storage to the shear by a 15-ton traveling crane. The shear for cutting the sheet bars to the desired foot weights is of the alligator type and is located centrally in the storage yard. A narrow gage track system is laid convenient to the shear so that the short sections of sheet bars can be piled in cradles, weighed and moved on hand trucks to a location more convenient for the crane to transfer them to the pair furnaces.

The sheet bars are piled on edge on a table at the rear of the pair furnace and are charged automatically in the heating chamber by a hydraulic cylinder.

Makers of Principal Equipment

Squaring shears	Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Electric trucks	Elwell-Parker Electric Co., Cleveland
Cranes: Bar yard 15-ton; hot mill 30-ton; annealing 40-ton; warehouse 10 ton and 15 ton	Morgan Engineering Co., Alliance, O.
Hot mills, sheet bar shear and cold mills	United Engineering & Foundry Co., Pittsburgh
Hot and cold mill motors	Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Buildings	Blaw-Knox Co., Pittsburgh
Sheet and pair furnaces	Tate-Jones & Co., Inc., Pittsburgh
Roller levelers	McKay Machine Co., Youngstown, O.
Stretcher leveler, oiling machine, scrubbing machines	Aetna Foundry & Machine Co., Warren, O.
Pickling machines	Mesta Machine Co., Pittsburgh
Annealing boxes	United Engineering & Foundry Co., Mesta Machine Co., Duquesne Steel Foundry Co., Pittsburgh
Annealing box bottoms	United Engineering & Foundry Co., Pittsburgh; Erie Forge Co., Erie, Pa.
Resquaring shear	Streine Tool & Mfg. Co., New Bremen, O.
Electric time clocks	Stromberg Electric Co., Chicago
Ventilating fan	B. F. Sturtevant Co., Boston
Wood block	Jennison Wright Co., Toledo, O.
Air compressors	Ingersoll-Rand Co., New York
Platform scales	Fairbanks Co., New York
Hot mill subway grating	Irving Iron Works Co., Long Island City, N. Y.
Slitting shear	Yoder Co., Cleveland
Reduction gears	Falk Corp., Milwaukee



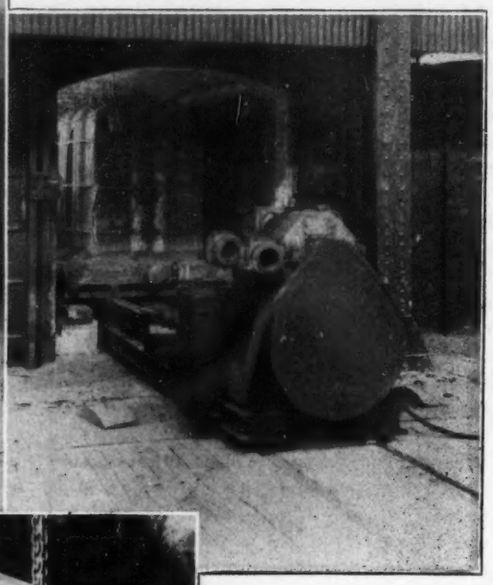


Fig. 6 (Above) Machines used for stretcher-leveling the finished sheets. The ends of the sheets are gripped in the cylinder-shaped gripping dies and are stretched hydraulically until their surface is rendered smooth. Fig. 9 (Below) Roller leveler through which the sheets pass in a wavelike manner to render them flat and smooth. This machine is equipped with 17 rolls, eight of which are included in the top series

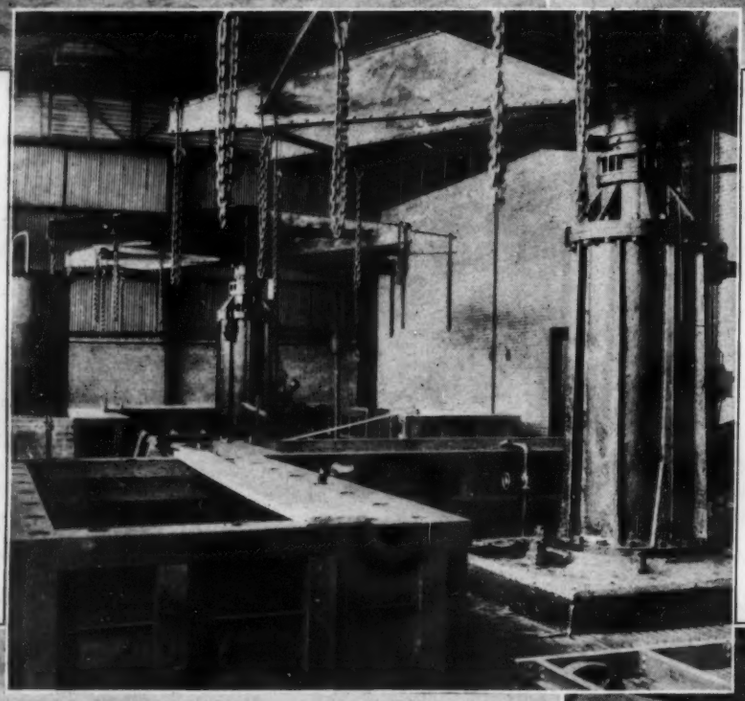
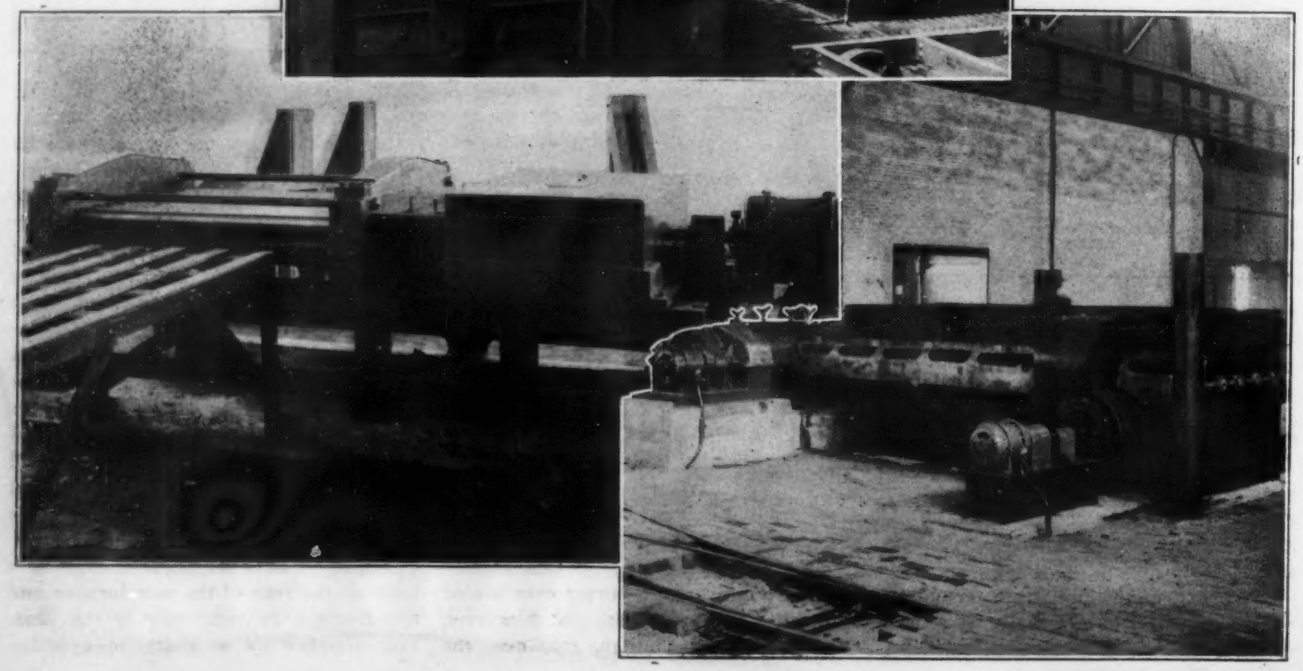


Fig. 7 (Above) Annealing boxes are moved into the annealing furnaces by the motor-driven charging machine in the foreground. Fig. 8 View of the pickling department which is equipped with two plunger-type machines. All scale and dirt is cleaned from the surface of the sheets by immersion in an acid bath. Fig. 10 (Below) One of the machines used for scrubbing the sheets after leaving the picklers.



The sheet and pair furnaces are fired with coke oven gas, which is taken from a vane and boosted to 6 pounds pressure per square inch. When the sheet bars have been heated to the proper temperature they are withdrawn in pairs and rolled on the roughing mill to within about 60 per cent of the length called for in the specifications. This is known as the breakdown, and when it is completed the partially rolled sheets are weighed and then transferred by crane to the breakdown pickler located at the southern end of the hot mill building, but closed off from it. The stock is handled in and out of this department by narrow gage trucks. After the sheets are agitated up and down in acid and properly washed they are returned to the hot mills for further reduction.

In the production of common sheets such as black, blue annealed and black for galvanizing, the stock is not pickled on the breakdown; but with the smooth surface required by consumers of automobile furniture and other specially finished sheets it is highly beneficial at this stage of reduction to remove any scale or dirt. The sheets not only are rendered smoother when finished off, but the time required to pickle the steel between the annealing and cold rolling processes is shortened. Upon arriving at the hot mills the breakdown sheets in a pickled state are matched in packs of threes. Each middle sheet is dipped in a solution of charcoal and water maintained at a suitable temperature by steam and then is replaced in its pack. The pack then is charged into the sheet furnace for further heating. The fine particles of charcoal prevent the sheets becoming welded together when the pack is being finished off. At various stages of reduction compressed air is directed on the surface of the pack to remove any foreign substance that might produce a blemish if rolled into the steel.

Develops New Roll Polisher

To maintain a smooth roll surface a polishing block is used. In the average mill the roll polisher usually consists of a rectangular pole about 10 or 15 feet long. One end terminates in a hook and within close proximity a block of abrasive material is attached. When a roll is to be polished a temporary cross bar is made to connect both housings, spanning the top roll at a height of about 4 inches. The hook on the polishing pole is placed beneath this bar and when the workman bears down on the opposite end of the pole, the abrasive material makes contact with the upper roll and thus scours its surface. The master mechanic at this plant, J. D. Williams, recently developed a new type polisher which has been adopted by the Youngstown Sheet & Tube Co. The abrasive block is of special design and is made to conform to the contour of the rolls when placed in the gap. Its holder serves as a plunger and is actuated by compressed air conducted to the cylinder through the handle. When the roll is to be polished the billy horns, or the guides on the catcher's side of the mill for directing the sheet away from the rolls are removed and the polishing device is lifted into position. A short piece of angle iron is riveted horizontally to the rear end of the cylinder and this resting on the billy bar, which is used for supporting the guides previously mentioned, serves as a holder. Turning a cock at the end of the handle permits compressed air at 150 pounds pressure per square inch to enter the cylinder forcing the abrasive block into the gap of the rolls and to hold it there until the pressure is released. This device polishes both rolls simultaneously.

It must be obvious, therefore, that every precaution is taken to keep the rolls smooth and the sheets free of scale and foreign material that is likely to cause them to be rejected or to be classified as second grade. As the packs leave the finishing mills they are dragged over the standing and placed near the squaring shears located along the eastern side of the hot mill department. Five shears are provided, each being equipped with knives 156 inches long. Each shear is actuated through gearing by a mere 10-horsepower motor and all motors in this connection are standardized to minimize the number of spares necessary to be carried in stock in event of a breakdown. A flywheel is an integral part of the driving mechanism of the shear and serves to balance the active blade.

The scrap, which accumulates around each shear, is transferred by crane to a baling machine housed in a separate building in one corner of the hot mill department. Instead of piling the shearings and clippings around the baling machine they are dumped on a loading platform which serves as the roof for the bundling department. The scrap is fed to the baling machine through a hopper and spout arrangement. The bundles of compressed sheet scrap are ejected from the baling machine and are loaded automatically in cars spotted on a railroad siding outside the building.

All shears are built to conform with the safety code of Ohio. The gears are equipped with guards while the driving shaft and cams are enclosed. The motor is started automatically. A knife switch is installed in the electric circuit and is attached to one of the building columns near the shear. In case the shear operator plans to set his knife, his instructions are not to trust the switch, but to snap a padlock on a safety device, which also is installed in the circuit, so that the motor cannot be started in case the switch is thrown into closed position.

Eight Furnaces Handle Annealing

Annealing follows the shearing operation, this being necessary to undo the hardness imparted to the sheets while undergoing reduction. The sheets are stacked on a cast iron tray or bottom and then are capped. Sand is placed around the joint where the cover rests on the bottom to exclude air. The box, weighing approximately 40 tons, and its contents is placed on a table of a charging machine by an overhead crane. This table then is moved in and out of the furnace by a rack and pinion actuated by a shaft driven by a 20-horsepower motor. Two shafts are provided, each serving four annealing furnaces. By this arrangement one charging machine is sufficient to serve all eight furnaces by merely transferring it by crane from one unit to another. Coke oven gas is used for heating the furnaces. As a safety precaution the cab on each of the two cranes in the finishing aisle is equipped with a red light. When an operator on one crane sees the red light on the cab of the other, he is not supposed to set his crane in motion on the runway until the signal disappears.

From the annealing department the sheets begin a straightway course toward the finishing and shipping end of the building. The sheet picklers for cleaning the sheets after the annealing process are of the plunger type the same as the unit used for pickling the breakdowns. A system of acid disposal is necessary on account of a law forbidding the dumping of acid into the Mahoning river, which flows along the company's property. The spent liquor from the breakdown and sheet pickling vats empties into a large retaining tank and is held for analysis. As the acid is drawn from this tank it is neutralized and again tested for acidity before being permitted to flow into the river.

The sheet picklers are housed in a leanto, which is bricked off from the finishing aisle on account of the acid fumes which arise from the vats. The sheets are brought from the annealing department by crane and set on trucks which transfer them over a narrow gage track from the finishing aisle through a doorway into the pickling department. After being pickled the sheets are returned by truck to the finishing aisle and are brought to rest alongside a scrubbing and drying machine.

Here another means is employed to cleanse the surface of the sheets so that

(*Concluded on Page* 1722)

150 Years in Steam Power History

Many Engineers Have Played a Prominent Part in Development of the Steam Engine and Turbine—Experiments with Mercury Turbine Indicate Need for Improvement Before Commercial Application Is Made

BY WILLIAM L. R. EMMET

THE history of steam and of heat engines has been a great one and many strong men have contributed to it. Many of its landmarks have been written into the text books and are more or less familiar. Many of the advances have been made by men who did not fully understand the theoretical merit of their improvements but the good, practical engineers generally know more than they write, and have partially developed theories, based upon comparison and analysis of facts, which are sufficiently near the truth to afford safe basis of action.

Watt developed the steam indicator and its records gave him a good idea of the steam possibilities. He lagged and steam jacketed his cylinders, knew the losses incident to cylinder condensation, invented the condenser, first used the air pump and undoubtedly knew, with a fair degree of accuracy, the possibilities within the range of his experience. Watt was a wonderful and eminently practical man and used most of the devices which make up engine practice today. There had been little need for the kinds of shop work required for his engines and he had to do much to develop manufacturing facilities. Notwithstanding all this advance, and the great uses in industry which rapidly developed, many years elapsed before the possibilities of steam uses were understood correctly.

Watt seldom used steam pressures above 7 pounds and it was not until about 1860 that pressures as high as 50 pounds were used. The demonstration of the true theory of steam probably contributed to the efforts for higher pressure, and to great increase in the use of compound engines. Engines of primitive type still exist and remind us of the rapidity of the advance of engineering. Many of our steamboats still use about 40 pounds steam pressure and engines about like those of Watt. A friend of mine bought an old mill site in England and in it, among other curiosities, was an engine with a wooden cylinder.

Takes Pay in Fuel Saving

When Watt began to introduce his engines commercially, he replaced primitive mine pumping engines of the Newcomen type and took as his pay a proportion of the fuel saving accomplished. This same thing was done by Corliss when he began to put his engines into New England mills. Corliss had made a substantial improvement by making a type of valve which would work and give an ample opening with a relatively small clearance and by so arranging his mechanism that he could govern by varying the cut-off which was made quick and definite. The gains immediately justified the throwing out of old engines and substituting new in many cases.

Fuel economy is so important that it seldom pays to use any engine but the best. In a 60,000-horsepower transatlantic liner a variation of 1 per cent in engine efficiency will mean something like $15,000 in annual fuel cost, without considering the cost of carrying the added fuel, which may be appreciable.

The large, compound corliss engines of 5000-kilowatt rating, such as were installed when the New York elevated roads were electrified, were the best engines existing when the steam turbine began extensively to replace the reciprocating engine as a source of power from coal. One of these engines working with its best adjustment, and at about 4000 kilowatts with 175 pounds steam pressure, used 17 pounds of steam per kilowatt-hour output. When run with equal load on the cranks, and with 6000 kilowatt output, which about represented common practice in the use of such engines, the consumption was 19 pounds per kilowatt-hour. The falling off with increase of lead illustrates the limitation of the reciprocating engine which, through lack of low pressure cylinder space and valve area, is incapable of much expansion in the steam and, therefore, cannot work effectively through a wide temperature range. The best large turbines today, running under this condition with a good vacuum, would use 13.7 pounds of steam, a gain of about 30 per cent, but since they would be run with much higher pressure, high superheat, and more advantageous feed heating conditions, the gain would be at least 50 per cent. With the latest developments of high steam pressure it would be considerably more, of course.

Parsons was the great early developer of the turbine idea. He built commercial turbines as early as 1886, and began to build really good, well designed turbines as early as 1895, his work on axial flow turbines having been interrupted for several years prior to 1894 by patent conditions. By 1903, when the first commercial turbines of the Curtis-type appeared, Parsons had made considerable commercial progress and had obtained results considerably superior in economy, and in other respects, to those obtainable from reciprocating engines. No large machines had been built and the number in use was small, but all the important features and possibilities of the type had been quite fully developed and were well understood. DeLaval and Rateau also had developed turbines. DeLaval's work was ingenious and interesting but not valuable commercially. Rateau's method was correct in principle but best suited to high speed machines of large capacity, and has not had really good application until recent years. The type proposed by Rateau, I think, had been considered before but not effectively developed.

Early Turbine Ideas Correct

Parson's method was original and so was the Curtis idea of directing the jet from a single nozzle so that it impinged successively on two or more rows of blades, giving what he called fractional abstraction of work from the steam velocity. This idea was well adapted to the building of machines of moderate speed of either small or large capacity.

The Parsons-type of turbine is subject to certain limitations and difficulties, but, if the leakage can be kept down, and the velocity relations correct, it is susceptible of good steam economies. Its thrust must be balanced by dummy pistons which, if not adjusted to close clearance, may involve serious leakage. Steam, in passing through a turbine, increases its volume in some cases as much as 600 fold; consequently there may be difficulty on the same shaft in arranging blade lengths and drum diameters to suit such a wide variation.

The Curtis turbine, as originally built, used in the high pressure stages only a segment of the wheel. It used large buckets with ample clearances, had little leakage loss and was easily designed to suit the highest degrees of vacuum. In the early applications of the Curtis turbine a persistent effort was made to induce owners and auxiliary builders to

From a paper presented at the Carnot centenary commemoration held at the Engineering Societies building, New York, Dec. 4. The author is a consulting engineer, General Electric Co., Schenectady, N. Y.

provide apparatus suited to the production of high vacuum. It is in the use of high vacuum that the turbine has its greatest advantage over the reciprocating engine. The success of these efforts for the use of high vacuum gave good economies even in stations where the turbines themselves were not of good efficiency.

The first commercial turbines were built with bucket designs adopted by Mr. Curtis on the strength of such limited experimental data as he had been able to collect. The first 500-kilowatt machine had two stages with three rows of buckets per stage and the second commercial machine, a 5000-kilowatt started in 1903, had two stages with four rows of buckets per stage.

More Stages Are Added

About the time that the building of these machine was started, the writer began experimenting to see what could be done with more stages and only two rows of buckets per stage. As a result of these experiments a 2000-kilowatt, 4-stage machine followed the 5000-kilowatt by about only three or four months, and gave greatly improved efficiency. This was followed by five and six-stage, vertical machines, which finally reached capacities as high as 15,000 kilowatts at 750 revolutions per minute. The large machines of this type had efficiencies of 67 per cent under conditions where the best, large, recent turbines would have had about 74 per cent. These vertical machines were practical and simple to build and operate. They had an immense commercial success and greatly advanced the central station idea.

About 1907, we began to devise means by which we could build higher speed machines which were better and less costly, and this change of speed led to the abandonment of the vertical type although it might be used effectively today with suitable arangements for preventing lateral vibrations. As means and occasion arose for increasing speeds and capacities, the possibility of gain by using wheels with single rows of buckets began to be perceived. The first of such machines retained a two-bucket wheel in the first stage with admission to a part only of the periphery, and many such machines still are made. The best large machines, however, have all single-bucket wheels and full peripheral admission in all stages.

The first attempt to use heat in higher temperature ranges than those practicable with steam was in the development of internal combustion engines, and the greatest advance in this line was the invention of Dr. Diesel, who wrote a book explaining the possibilities of his engine before any were built. The practical details of Diesel engines have been improved gradually and their use has extended steadily although they have not had any important part in the power station industry. They are being used more and more widely in ships where an economical user of oil has great practical advantage.

The most recent step in the effort for higher economy in making power from fuel, is the writer's use of mercury vapor to operate turbines in temperature ranges above those which are practicable with steam. In this the heat of the exhaust of the mercury turbine is used to make high pressure steam which can be applied in any usual way. An installation of this kind has been operating a good part of the time for the past year at an average load of a little over 1000 kilowatts on the mercury turbine. The operation has been successful and practical generally, although certain limitations of the mercury boiler have developed, which show that this part must be improved before extensive commercial applications can be undertaken. An effort is being made to bring the Hartford installation to a thoroughly commercial state and the prospect that this will be accomplished ultimately seems good. In combination with the best steam applications which have so far been developed, this process should give a gain in output from fuel of about 40 per cent over that which could be done with the steam alone, and, under the conditions of any existing station, the gain should be much more. These figures indicate that the undertaking is worth some effort.

Metals Committees Meet at Standards Bureau

A series of meetings of the various metals committees of the American Society for Testing Materials was held in Washington recently. The daytime sessions were held at the bureau of standards, and the reports presented included ones on the standardization of corrosion tests, methods of sampling and testing ferrous alloys, and specifications and tests for steel tubes, pipes, plates, forgings, etc. Other alloys such as those of aluminum, also were considered.

A special trip was made to Annapolis, Md., to inspect specimens of sheet iron and steel, exposed for a weathering test at this place 7 years ago. These sheets are one of three sets, similarly exposed, the one at Annapolis being subject to sea air, another at Fort Sheridan, Ill., and a third set at Pittsburgh. The test at Pittsburgh is over, all the sheets having failed. The sheets at Annapolis and Fort Sheridan are beginning to fail, but each case shows that copper bearing sheets stand up better than those free from copper.

Plans for a similar series of tests of wire screens were reported to another committee of the society. These tests, which are being undertaken with the aid of the bureau involve the exposure of screens in four locations. A similar investigation is planned to cover galvanized and other coated metals. A feature of the meetings was a special trip through the laboratories of the bureau which gave the delegates some idea of the variety of work which is being carried on.

Proposes Standards for Range Boilers

Recommendations for the adoption of eight standards as to capacity of copper range boilers, three standards of their length and seven standards of diameter were placed before the conference of representatives of manufacturers, distributors and users of this product Dec. 8 with the simplified practice division of the department of commerce, which is co-operating in a simplification program for the industry. The conference developed because of the fact that, with an estimated production of 75,000 copper range boilers annually, no specifications exist.

Surveys made in the copper range boiler industry in the last few months have revealed that 60 per cent of the production is in one size. The recommendations yesterday also urged that standard tappings and classifications of construction be adopted.

Among those attending were representatives of the National Association of Master Plumbers, National Pipe and Supplies association, Trade Extension bureau, United States bureau of standards, the United States chamber of commerce and several technical bodies. Manufacturers represented at the conference were: E. B. Badger & Sons Co., and the Star Boiler Co., of Boston; Dahlquist Mfg. Co., and Gerstein Bros. & Cooper, South Boston, Mass.; Enterprise Mfg. Co. and the Riverside Boiler Co., Cambridge, Mass. Artesian Metal Products Co., Charlestown, Mass.; Randolph-Clows Co., Waterbury, Conn.; Hayes Mfg. Co., Paterson, N. J.; E. G. Schafer & Co., Washington, and others.

Twenty-one cables each 550 feet long are being placed across the Providence harbor to transmit power at 22,000 volts from the new plant of the Narragansett Electric Light Co., across to the city of Providence, R. I.

In Electric Furnace

Iron Borings and Turnings Ordinarily Used Although Iron Ore May Be Substituted—Electrode Consumption Is Small

BY THEODORE SWANN

How Ferro Is Pro

DURING recent years, there has been a material increase in the use of ferrophosphorus in the steel industry. It has been observed, when rolling sheets, that those made of southern iron did not have to be rolled at as high a temperature as the others and, consequently, did not stick together. The reason was found to be the phosphorus content of southern iron. Therefore, it was thought that an addition of phosphorus to sheet steel of other than southern origin would give the same result as the use of southern iron. At first, this addition was made by introducing phosphate rock in the blast furnace and reducing it together with the iron ore; but, because of the necessity for only small quantities of this grade of iron, the process was not satisfactory. The manufacture of ferrophosphorus then was introduced, so that additions might be made to the open-hearth furnace or ladle.

Ferrophosphorus was first manufactured in the blast furnace. This method, however, can only economically produce a grade of product up to about 20 per cent. To produce a higher grade, it would be necessary to charge a larger proportion of phosphate-bearing material; and as the rate of absorption by the iron is low, there would be an increased loss of phosphorus oxides. This feature makes the production of a higher grade ferrophosphorus in the blast furnace uneconomical. The use of high-grade ferrophosphorus in the steel requires a smaller addition and involves, besides the economies in handling, an additional economy in transportation. The alloy with a higher percentage than 20 per cent can be made only in the electric furnace.

In the ordinary operation of the electric furnace in the production of ferrophosphorus, an alloy may be produced containing 26 per cent phosphorus; this is the limit, for it does not seem possible to produce a higher phosphorus alloy even if large excesses of phosphatic materials are used. The reasons for the difficulty in raising this percentage of phosphorus are not known. The compounds Fe_3P, containing 15.6 per cent, and Fe_2P, containing 21.7 per cent phosphorus, have been studied and it appears as if the alloy produced, containing percentages of phosphorus within these limits, is a mixture of these two compounds. While some investigators have stated that as many as seven compounds of phosphorus and iron have been isolated, the compound Fe_4P_3, containing 29.33 per cent phosphorus, is the closest within the range produced by the electric furnace. It may be there is a compound Fe_3P_2; however, such a compound has not been isolated and it may be that the alloy produced in the electric furnace, containing 25 per cent phosphorus, is a mixture of the compounds Fe_3P and Fe_4P_3, respectively.

The raw materials used in the manufacture of ferrophosphorus consist of phosphate rock, coke, silica and iron scrap. The phosphate rock may be of the high grade commonly used in the manufacture of fertilizer, although a material containing higher percentages of silica than may be used in fertilizer manufacture has been found satisfactory. The excess of silica is not objectionable because it combines with the lime in the phosphate rock and is withdrawn with the slag, in reality reducing the amount of silica that would otherwise be added.

The principal source of phosphate rock is in the large deposits in Florida and Tennessee, but there are even larger deposits in other portions of the country. In the northern portion of Florida, hard rock phosphate is found in tertiary formation; in the southern portion, around Tampa, there is the pebble phosphate, of more recent origin. Brown Tennessee phosphate rock, a residual deposit of highly phosphatic limestone, is found near Nashville, Tenn.

Iron borings or turnings ordinarily are used but it is possible to use iron ore instead. When iron ore is substituted, additional coke and power are necessary, but this is largely compensated for by the fact that the iron ore is less expensive. When scrap becomes unusually expensive, other iron-bearing materials are used, such as pyrites cinder, mill cinder, iron ore, and a sintered mixture of pyrite cinder and low-grade phosphate rock. While extra power and coke are required to reduce the iron in these, the cost of the iron contained is less and the final costs can be balanced.

By varying the amount of iron charged, the phosphorus content of the ferrophosphorus may be varied. A certain amount of iron oxide tends to help reduce the volatilization when smelting. Coke breeze for the electric furnaces at Anniston, Ala., is obtained from the Birmingham by-product coke ovens. Silica rock of high purity abounds in the mountains and streams close to the plant at Anniston. Phosphorus could be extracted from the rock by heating it with coke or sand, but an inspection of the heat of the reactions involved shows that the reactions that use coke and sand to-

(*Concluded on Page* 1717)

Production Processes Are Described

FERROPHOSPHORUS, an alloy of iron and phosphorus containing from 20 to 26 per cent phosphorus, is used widely in the steel industry, being added in the ladle to basic open-hearth steel to replace the phosphorus which has been removed during the steelmaking process. Two methods of producing ferrophosphorus are used, namely, the electric furnace method and the blast furnace method. The former was the first to be used and the bulk of the tonnage still is made by that method. More than 20 years ago J. J. Gray Jr. was successful in producing ferrophosphorus in the blast furnace and ever since then has continued to operate his Rockdale, Tenn., furnace on that product. It is the only blast furnace in the United States making this alloy. Little information ever has been published on the methods of producing ferrophosphorus, consequently the articles on this and the page opposite are of unusual interest. Both are from papers presented at the Birmingham, Ala., meeting of the American Institute of Mining and Metallurgical Engineers, Oct. 13-15.

The author is president, Federal Phosphorus Co., Birmingham, Ala.

phosphorus duced

In the Blast Furnace

Best Results Require Cool Top, Limited Fusion Zone, Hot Bottom and Good Mechanical Condition of the Stock

BY JAMES A. BARR

FERROPHOSPHORUS, an alloy of phosphorus and iron, or perhaps a physical mixture of definite compounds of iron and phosphorus, has become of increasing importance as the use of the basic open-hearth furnace has extended. Commercial ferrophosphorus is a porous, brittle metal of crystalline structure and often has a bluish metallic luster. A typical analysis is as follows:

	Per cent
Phosphorus	18-22
Iron	80-76
Oxygen	0.2
Sulphur	0.3
Silicon	0.1
Carbon	0.1
Manganese	0.2

This alloy first was made in an electric furnace, as it was thought that the high heat of the electric arc together with the reductive effect of carbon was necessary. About 1898, J. J. Gray Jr., was producing a high phosphorus pig iron in his furnace at Rockdale, Tenn., by using high phosphorus ores were difficult to obtain, he conceived the idea of increasing the phosphorus content of the pig iron by the addition of phosphate rock to the furnace burden. When the phosphorus content of the pig was kept low and only small amounts of phosphate rock were added to the burden, no particular troubles were encountered, but when he increased the amount of phosphate rock to produce an 18 per cent alloy, his furnace troubles rapidly multiplied. After many failures and freezeups, he was partly successful in making short campaigns on 19 to 20 per cent "ferro."

At first, when the furnace got in bad shape on ferro, he would switch to a regular pig iron burden until the furnace was brought around sufficiently to start on ferro again. About this time, Mr. Gray applied for and obtained his first patent. As he grew more skilled in the furnace operations, he was enabled to extend the furnace campaigns and produce ferrophosphorus continuously for the life of the furnace lining. These improvements were made the subject of another patent issued in 1916.

Essentially, ferrophosphorus is the result of smelting a mixture of iron ore, phosphatic rock, siliceous flux and coke, under intensely reducing furnace conditions, with heated blast, above a bath of molten slag and ferrophosphorus. The iron ore, a limonite, is obtained from Mr. Gray's mine, 50 miles south on the Louisville & Nashville railway, at Iron City. The ore is a nodular variety occurring in a clay matrix. The beds are stripped and mined by steam shovels, hauled by side-dump cars and locomotives to washers, where the clay is washed out in log washers and trommels, followed by McClanahan-Stone type jigs for the separation of flint. The concentrated ore runs about as follows: Iron, 45 per cent; silica, 10 per cent; and phosphorus, 2 per cent. Silica flux is obtained from jig tailings, which run quite high in iron as well as silica. Sometimes small amounts of washed sand and gravel, from Spruce Pine, Ala., are used.

All the incoming materials are brought in on a high line from Louisville & Nashville connections and dumped from a trestle onto a concrete tunnel, in which a charge car with a multiple-scale beam operates to collect the furnace charge. The charges are dumped into a skip, hoisted on an incline track, and end dumped through a single bell top into the furnace. The furnace has the following dimensions: Height, 40 feet; inside hearth diameter, 12 feet; and bosh angle 80 degrees. The hearth and bosh are water cooled, as the molten charge is extremely corrosive and would soon cut its way through an uncooled jacket and lining. Six water-cooled bronze tuyeres are connected through the usual penstocks and nozzles to a brick-

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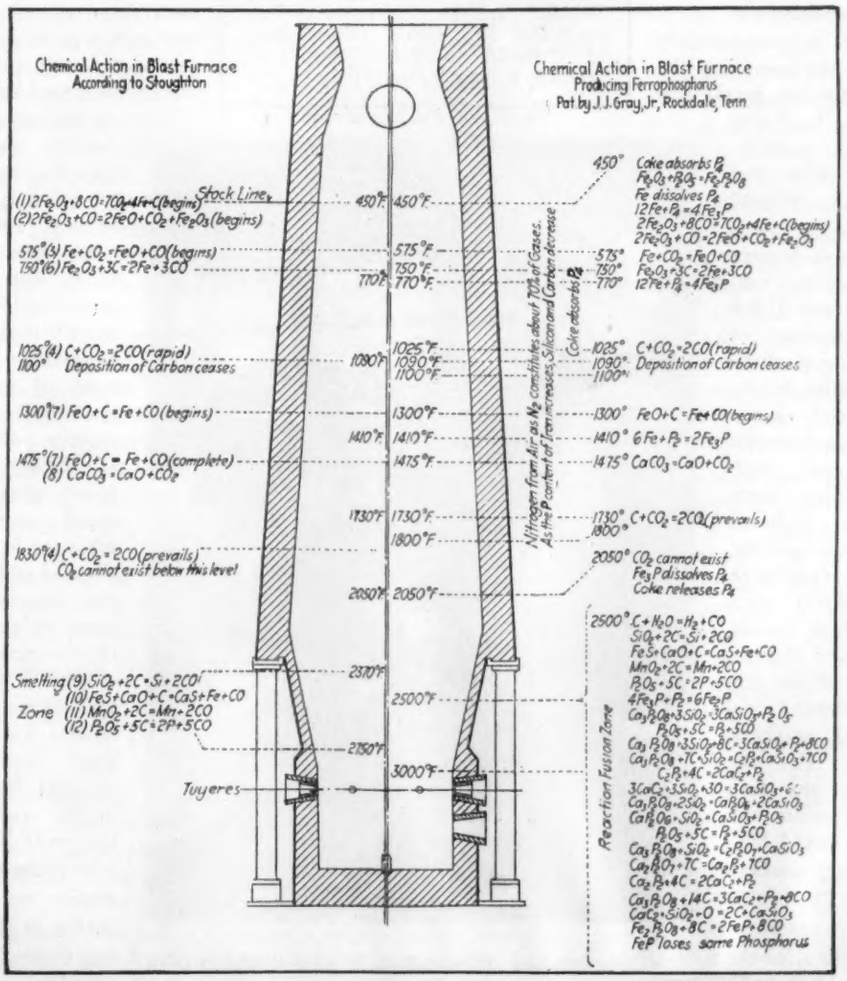

Chemical Action in Blast Furnace According to Stoughton
Chemical Action in Blast Furnace Producing Ferrophosphorus Pat by J.J. Gray, Jr, Rockdale, Tenn
Stock Line
Tuyeres
Smelting Zone
Reaction Fusion Zone
Nitrogen from Air as N_2 constitutes about 70% of Gases. As the P content of Iron increases, Silicon and Carbon decrease.
(Coke absorbs P_2)
FeP loses some Phosphorus

STACK REACTIONS WHEN MAKING PIG IRON AND FERROPHOSPHORUS

The author is consulting mining engineer, International Agricultural Corp., Mt. Pleasant, Tenn.

Large Uses of Steel In Small Ways

ON ACCOUNT of their superior qualities of electric conductivity the nonferrous metals are generally credited with practically a monopoly in the telephone field, yet in the course of a normal year the manufacture of only the desk telephone stand, that black-japanned instrument which brings the whole United States within the reach of an arm, and the subscriber box account for approximately 4350 tons of steel.

Practically all telephone desk equipment installed by the Bell and associated companies being the product of the Western Electric Co. at its works in Hawthorne, a suburb of Chicago, the tonnage of steel consumed there just about blankets the telephone industry of the United States. There are other manufacturers, of course, but chiefly of inter-office and plant equipment.

Considering only the instrument as it stands on the desk in the home and the office, it requires 1,400,000 pounds of steel annually for the base and the upright. Into the transmitter go 100,000 pounds of steel and into the receiver 950,000 pounds more. Some of it is magnetic iron because it demagnetizes speedily. Then the subscriber set, the small metal box affixed to the desk-bottom or baseboard and enclosing the bell-ringing mechanism, calls for 6,250,000 pounds of steel, chiefly sheets. Breaking down these totals into individual uses, such small items as clamping nuts, screws, base plates, terminal plates and washers run into the millions. In 1923 the Hawthorne works produced 1,455,000 steel clamp nuts for its desk stands, an identical number of clamps, 1,105,000 base plates, 880,000 terminal plates, 14,000,000 steel screws and 6,600,000 washers, among other things. For the transmitter portion of the desk stand a year's production will consume 9,425,000 screws, 1,350,000 connectors, 480,000 washers and 2,005,000 bridges. The bridge is the base of the transmitter and forms the foundation for the entire talking mechanism of the instrument. On it are mounted the diaphragm, carbon buttons and other parts of the speaking apparatus.

One year's run of receivers requires 3,100,000 steel diaphragms, 3,390,000 magnets, 1,875,000 heel pieces and 4,200,000 cores.

Generally speaking, the equipment and operations used in the manufacture of these various items of desk-stand parts conform to general practice. The compactness of the stand demands extreme accuracy. The magnetic ends in the receiver, for example, must be accurate to almost 1/10,000-inch, or the thickness of a bee's wings. The case surrounding the bell-ringing mechanism is stamped from sheet steel.

While today there are some 15,000,000 telephones in the United States, by no means is all the equipment of the desk stand type. In the rural districts the wall type is generally the standard equipment, but the percentage of the desk type is rapidly growing. The transmitter and receiver construction for the wall type parallels that for the desk type. The bulk of the weight of the desk stand today is in nonferrous metals, partially because of their better adaptability to japanning and other finishing operations, but the use of steel which is cheaper, is increasing each year. Development of drawing and punching machines has made it possible to produce parts for desk telephones at relatively low cost and of sufficient strength to withstand the rough usage to which they are subjected in ordinary service. This estimate of tonnage represents only that entering into the office or home set and does not take account of the much larger consumption of steel in various forms for central station equipment and transmission lines, the latter being of great proportions. Substitution of steel for more costly metals in this branch of industry parallels what has happened in many others, the effect of tonnage production and high development of quality in the steel industry making it much more economical to use than other metals.

Telephones

THIS is the twenty-eighth of a series of articles dealing with some of the obscure uses of steel which go far toward absorbing the great American tonnage.

The first article on "Corsets" appeared Nov. 22. Other articles were "Pins," Dec. 6; "Pens," Dec. 20; "Cotton Ties," Jan. 17; "Steel Wool," Jan. 31; "Toys," Feb. 14; "License Plates," Feb. 28; "Spinning Rings and Travelers," March 13; "Hypodermic Needles," March 27; "Card Clothing," April 10; "Shoe Steel," April 24; "Tie Plates," May 8; "Crushed Steel," May 22; "Tacks," June 5; "Skates," June 19; "Knives and Forks," July 3; "Phonograph Needles," July 17; "Surgical Instruments," July 31; "Fence Posts," Aug. 14; "Needles," Aug. 28; "Eyeglass Cases," Sept. 18; "Golf Clubs," Oct. 2; "Fishing Tackle," Oct. 16; "Mechanical Pencils," Oct. 30; "Dental Drills," Nov. 13, "Burial Caskets," Nov. 27, "Pocket Knives," Dec. 11.

MAKING SHELLS FOR DESK STAND TELEPHONE SETS OF STEEL

Ferrophosphorus in the Blast Furnace

(*Concluded from Page* 1714)

lined bustle pipe, which distributes the blast.

Phosphate rock, in the lump form, is obtained from the Mt. Pleasant field about 6 miles to the north; a large firm lump being preferred, running high in BPL ($Ca_3P_2O_8$) and low in free lime. A typical analysis is:

	Per cent
$Ca_3P_2O_8$	76.0 to 78.0
Equivalent to P	15.2 to 15.6
SiO_2	4.5
Free lime, $CaCO_3$	5.0

Other materials may be used in the furnace burden, such as mill cinder, running high in iron and silica, iron turnings, scrap pig, and shot ferrophosphorus from the magnetic separating plant. A good firm grade of coke is used and the breeze is screened out in the usual manner. The presence of too much fines in the burden tends to form scaffolds and make furnace slip.

The furnace gases are handled at about 450 to 500 degrees in a brick-lined downcomer through two dust catchers into a cast iron balloon gas washer; the flue dust is wasted. A battery of four checker-filled, single-pass stoves use part of the furnace gas tc heat the blast to around 1000 degrees Fahr. The remainder of the gas, and there is a large excess over the usual iron blast furnace quantities, is burned under a battery of Rust-type water-tube boilers, which supply steam for blowing engines, pumps and general purposes.

Blast is furnished by a McClanahan-Stone type, horizontal, poppet-valve engine of early manufacture, but still giving excellent service. It is equipped with leather flap valves, a forerunner of the modern plate valve; the cylinder is 6 x 6 feet and when run at the usual 24 revolutions per minute furnishes 7200 cubic feet of free air per minute at 12 to 15 pounds pressure. A smaller vertical Weimer-type blowing engine is kept in reserve. The proper manipulation of blast volume is important. Too much air causes the melting line to rise, tends to form scaffolds, and burns coke needed for the reduction of phosphorus.

Coke Burden is Doubled

The usual operating procedure is to add five regular charges consisting of phosphate rock, iron ore or mill cinder, high silica tailing, shot ferrophosphorus and coke. Of the latter it is necessary to use about twice the amount required in pig iron practice. Every fifth time, a regular pig iron charge is added to help keep the furnace working freely and consists of iron ore, limestone and coke. Sometimes a blank coke charge is added in addition to the above, according to the needs of the furnace.

Slag is tapped every 3 hours into a water filled granulating pit. The following analysis is typical:

	Per cent
Al_2O_3	5.18
SiO_2	43.59
CaO	35.18
FeO	4.96
P_2O_5	7.33
S	1.07
MnO	0.54

The ferrophosphorus is tapped every 6 hours and run on to a floor paved with cast iron bricks, where it cools in thin slabs and can be broken and handled easily. At the end of the cast, when the iron notch is blown free of slag by blast pressure, the presence of lumps of incandescent coke is noticeable and shows that it is present in the tuyere zone to effect the reduction of the phosphorus. The capacity of the furnace is 35 tons of ferro each 24 hours, or about half that of usual pig iron production.

Some phosphorus oozes out of the cracks in the jacket and collects under water. During the war, this was scraped up and sold. Occasionally white fumes of phosphorus burning to P_2O_5 can be seen. Some of the phosphorus is lost in the stack gases and the remainder in the slag. The problem of saving P_2O_5 from blast furnace gases is complicated by the large volume, that is, about five times that from an electric furnace.

Recovers Much as Shot

As the slag contains considerable shot ferrophosphorus, provisions are made for its recovery. The slag is dipped from the granulating pit by a bucket operating locomotive crane and dumped on to a drainage pile and finally fed by the same crane into a hopper located over the feed of a 5 by 40-foot direct-heat, counter-current, rotary dryer. The dried slag is elevated and discharged on to a Dings-type belt-type magnetic separator. The reclaimed slag is fed back with the furnace burden as previously described. The rejected slag is chuted directly into railroad cars for use as ballast.

Ferrophosphorus is used mainly for increasing the phosphorus content of steel and is added directly to the ladle. The writer observed one steel company adding 650 pounds to the 100-ton ladle. As is well known, the basic open hearth removes practically all of the phosphorus from the steel. When rolling thin sheets it has been found that a small percentage of phosphorus is necessary in the steel to make the sheets strip readily. Certain other classes of steel also require small amounts of phosphorus in exact quantities. Ferrophosphorus also may be added to a cupola charge where the pig is too low in phosphorus for the casting requirements.

Making Ferrophosphorus in Electric Furnace

(*Concluded from Page* 1715)

gether give the lowest temperature and the smallest heat of reaction. Part of the phosphorus liberated is absorbed by the iron, making ferrophosphorus.

The metal and the slag from the furnace are tapped together. From the tap hole, the products run into a large iron chill in which the metal remains, the slag floats and overflows into a bed of sand where it is chilled and broken up. The slag carries with it a certain amount of phosphorus, but the loss can be minimized by proper burdening. The ferrophosphorus, after cooling, is removed from the chill and broken in pieces.

In the production of high-grade ferrophosphorus, a large excess of phosphorus must be charged and the losses by volatilization become very large. For this reason, a closed furnace is used, which permits drawing off the vapors of phosphorus through a gas main. By admitting air and moisture into these vapors, phosphorus pentoxide and then orthophosphoric acid is formed. The orthophosphoric acid is collected by condensation and electric precipitation with the Cottrell precipitator.

In the production of low-grade ferrophosphorus, 17 to 19 per cent phosphorus, it is not necessary to use the enclosed type furnace and a rectangular smelting alloy type furnace is used. If the higher grade ferrophosphorus, containing 25 per cent phosphorus, is to be produced, it is necessary to use the enclosed type furnace in order that the evolved phosphorus fume may be collected. In the production of ferrophosphorus, the electric furnace operates at about a 94 per cent power factor and a 90 per cent load factor may be procured.

The average electrode consumption, for ferrophosphorus operation, may be kept at 5 pounds per 1000 kilowatt hour input. In view of the fact that the furnace charge contains such a high percentage of carbon, it is not surprising that the electrode consumption is so small. Electric furnace ferrophosphorus is marketed in two grades, namely: 17 to 19 per cent, averaging 18 per cent; 23 to 25 per cent, averaging 24 per cent. Complete analyses of the two grades are about as follows:

	18 per cent	24 per cent
Phosphorus	18.000	24.000
Silicon	0.500	0.750
Sulphur	0.005	0.005
Carbon	0.250	0.250
Iron	80.000	74.000
Miscellaneous	1.245	0.995
Total	100.000	100.000

Here and There in Industry

Live Information Which Records the Expansion of Various Lines of Productive Enterprise

IMPROVED business conditions have necessitated doubling the force of the Stearns Conveyor Co., Cleveland, according to Earl Stearns, president of the company, which makes and installs complete industrial and power plant material handling systems. As an illustration of the improvement in business conditions, Mr. Stearns states that, during the week prior to election and the two weeks following, the Stearns company closed up more contracts for material handling equipment than during the five preceding months. Present rate of business, he states, is maintaining an average on a par with that started in November. In the report Mr. Stearns calls attention to the fact that the largest number of calls for mechanical material handling equipment now are coming from the glass, rubber and automobile industries. Among the orders recently booked by the Stearns Conveyor Co. is one from the Fisher Body Corp., Cleveland, which placed a contract for 15 body conveyors.

* * *

AMONG other projects recently constructed by the Furox Co., Los Angeles, manufacturer of welding and cutting apparatus and supplies are two acetylene plants at Los Angeles and Oakland, Calif., through which it will supply its Pacific coast trade. Stocks are maintained at 12 other cities.

* * *

AUTOYRE CO., INC., Oakville, Conn., is building a 4-story 40 x 160-foot concrete building as a plant extension. This company manufactures bathroom fixtures and formed wire and flat metal stampings of various kinds. The company reports a marked increase in business during the past few months.

* * *

ENLARGEMENTS recently completed by the Maynard Electric Steel Casting Co., Twenty-second avenue and Kilbourn road, Milwaukee, have increased capacity 100 per cent, and have made that company one of the largest producers of electric steel castings in that section. The new plant will be ready for occupancy about Feb. 1.

* * *

REORGANIZATION of the Greenville Steel Car Co., Greenville, Pa., recently was effected and operations will be resumed by the company Jan. 1. F. D. Foote, associated with the organization since its inception, is president of the reorganized company. K. C. Gardener, sales manager of the Greenville plant since 1922, is the new vice president. George H. Rowley is secretary and a director. F. L. Fay is chairman.

* * *

CONTRACTS for the first unit of the general plant to be constructed by C. U. Williams & Son, Bloomington, Ill., will be awarded the last day or two of 1924, according to A. T. Simmons, of the special sales department. The new plant will be 96 x 300 feet, 1-story, mill design. The Williams company manufactures all parts of its oil heating machines, and equipment necessary for the employment of 300 men will be required.

* * *

OPERATIONS have been started again by Emerson & Stevens Mfg. Co., Oakland, Me., manufacturer of scythes and axes, production having been stopped by a fire on Dec. 2, 1923. R. M. Stowell, manager of sales for the past 12 years, purchased the business from the former control and on Oct. 10, 1924, started constructing a new plant. The new structure, 82 x 186 feet, has been completed and axes and scythes are being produced again by the hammering process. The business was established in 1870 by Luther D. Emerson, William Pinkham and George Stevens.

* * *

ANNOUNCEMENT is made by the Jewett Radio & Phonograph Co., Detroit, of a large expansion of its manufacturing facilities. The expansion takes the form of a new plant and general headquarters in the northern outskirts of Pontiac, Mich. Plans for the first unit have been completed by Fisher Bros., architects. Construction work will begin immediately and on the company's 5½-acre tract near Sylvan Lake. The building will be fireproof construction—brick, steel and cement, with a white stone front. Each unit will be two stories, 50 x 200 feet in size. The plant will be devoted exclusively to the manufacture of radio sets and equipment. "The radio industry is developing and taking definite form very much as the automobile industry did 20 years ago," declares President E. H. Jewett of the company. "In fact, radio is moving faster than its famous predecessor did, at a similar age. The industry is becoming rapidly stabilized. The general public is learning the immense superiority of standardized equipment. Merchandising methods compare favorably with those of almost any long established business. With four years of prosperity assured by the verdict of the people on election day, radio will fo forward at an even greater rate of speed." As soon as the Pontiac plant is finished, the Jewett general offices will be moved there, from the Twelfth street Terminal building, where they have been located, during the development period of the company. The Pontiac plant will not displace the large works which the firm operates at Allegan but will take over the manufacture of new products of the company.

* * *

BESIDES buying a large quantity of equipment for the new Ajax Motors Co., which will use the former Mitchell automobile plant in Racine, Wis., the Nash company of Kenosha, Wis., also is enlarging capacity of its main works and has just announced that the capacity of the Milwaukee plant, manufacturing light six-cylinder cars, will be increased about 50 per cent within a short time. This will be accomplished by installing machinery in the former LaFayette automobile works at Milwaukee, which closed Aug. 1 with the discontinuance of this 8-cylinder car because the operation was unprofitable. The Ajax plant is expected to start quantity production, about March 1 or April 1, and will have a capacity of 200 to 300 cars a day.

* * *

AMERGER has been effected between the Metallic Roofing Co. of Canada, Ltd., with plants at Toronto and Winnipeg, and Western Steel Products, Ltd., with plants at Winnipeg and several other western cities. The business of the two companies in western Canada will be conducted by the Western Steel Products Ltd., and the business in eastern Canada will be continued under the name of the Metallic Roofing Co. of Canada Ltd. Horace Ormond continues as president of the companies. R. R. Symington, for many years secretary and treasurer of Western Steel Products has been appointed vice president and managing director. A. Wachsmith has been appointed general sales manager and F. T. Foxcroft, for many years manager of the Metallic Roofing Co.'s Winnipeg plant, becomes sales manager at Winnipeg.

Men of Industry

Personal News of a Business Character Pertaining to the Iron and Steel and Related Fields of Enterprise

WALTER S. TOWER, commercial attache for the department of commerce, at London, formerly chief of the iron and steel division of the department and a trade advisor, has resigned to become associated with the sales department of the Bethlehem Steel Co., it is learned from an authoritative source. Mr. Tower is a Harvard graduate and holds M. A. and Ph. D. degrees from the University of Pennsylvania. He is a native of Massachusetts. During the war he was director of planning and statistics of the United States shipping board, and later was trade advisor to the Consolidated Steel Corp., New York, later having been appointed chief of the iron and steel division of the department of commerce, in July, 1921. Several months later he was appointed commercial attache at London, accredited to the American embassy there. In 1906-10, Mr. Tower was assistant professor of geography at the University of Pennsylvania, and in 1911-16 he was associate professor of geography at the University of Chicago. He has written extensively on shipping, traffic and port problems.

* * *

Joseph G. Butler Jr., celebrated his eighty-fourth birthday at his home in Youngstown, Dec. 21.

* * *

Joseph J. Beeman, 14559 Hubbell avenue, Detroit, has been appointed agent in Detroit for the Swartwout Co., Cleveland, industrial oven engineer and manufacturer.

* * *

J. S. Pyeatt, formerly president of the New Orleans, Texas & Mexico railway has been elected president of the newly reorganized Denver & Rio Grande Western.

* * *

E. M. Long, for some years identified with the McLain Fire Brick Co., Pittsburgh, has succeeded H. R. Beegle as general manager of the Beaver Clay Mfg. Co., New Galilee, Pa., manufacturer of face brick, fire clay, etc.

* * *

E. L. Becker has been appointed by the Newport Rolling Mill Co., Newport, Ky., to direct advertising and sales promotion work which has been handled by Frank A. Moeschl, general sales manager.

* * *

Albert L. Marks, president of Albert L. Marks & Co., scrap dealers, Chicago, is leaving early in January for a vacation of several months in the West, but will resume active duty on his return in the spring.

* * *

P. Blair Lee, who has been engaged in special work for the vice president and general manager of Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has been appointed works manager.

* * *

J. F. Kroske has been appointed manager of the pneumatic tool sales for Ingersoll-Rand Co., 11 Broadway, New York, manufacturer of compressed air and other equipment, in the Pittsburgh territory with headquarters at Pittsburgh.

* * *

Philip C. Gunion, advertising manager of the Hyatt Roller Bearing Co., Harrison, N. J., has been placed in charge of development and research for that company and made a member of the sales board in addition to his advertising duties.

* * *

E. N. McKelvey, assistant to I. N. Scott, president of the Wheeling Steel Corp., Wheeling, W. Va., recently has been made general manager of the Steubenville works of the Wheeling corporation, succeeding A. J. McFarland, resigned.

* * *

E. M. Mentzer, formerly manager of the Weirton tin mills, of the Weirton Steel Corp., Weirton, W. Va., has been appointed general superintendent in charge of all tin plate operations of the company. Mr. Mentzer is succeeded by H. G. Richards. E. E. Paddack has been appointed works manager of the Steubenville tin plate division.

* * *

K. L. Clark has been appointed western representative of the tool steel department of Henry Disston & Sons, Inc., Philadelphia, with headquarters at Washington boulevard and Jefferson street, Chicago. Prior to affiliating with the Disston organization, Mr. Clark was associated with the Firth Sterling Steel Co. and the Latrobe Electric Steel Co. in the sale of tool steel in Detroit and Chicago.

* * *

F. A. Merrick, vice president and general manager of the Canadian Westinghouse Co., of Hamilton, Ontario, has been elected vice president and general manager of the Westinghouse Electric & Mfg. Co. Mr. Merrick's headquarters will be at East Pittsburgh, Pa. E. M. Herr, president of the Westinghouse Electric & Mfg. Co., will transfer his offices from East Pittsburgh to New York.

* * *

J. Louis Reiber has succeeded John McElwain, resigned, as vice president of W. J. Rainey, Inc., 52 Vanderbilt avenue, New York. Mr. Reiber was connected with the sales department of Carnegie Steel Co., Pittsburgh for about 13 years and for the past five years has been sales manager of the Rainey-Wood Co., which position he will retain as well as vice president in charge of sales of W. J. Rainey, Inc.

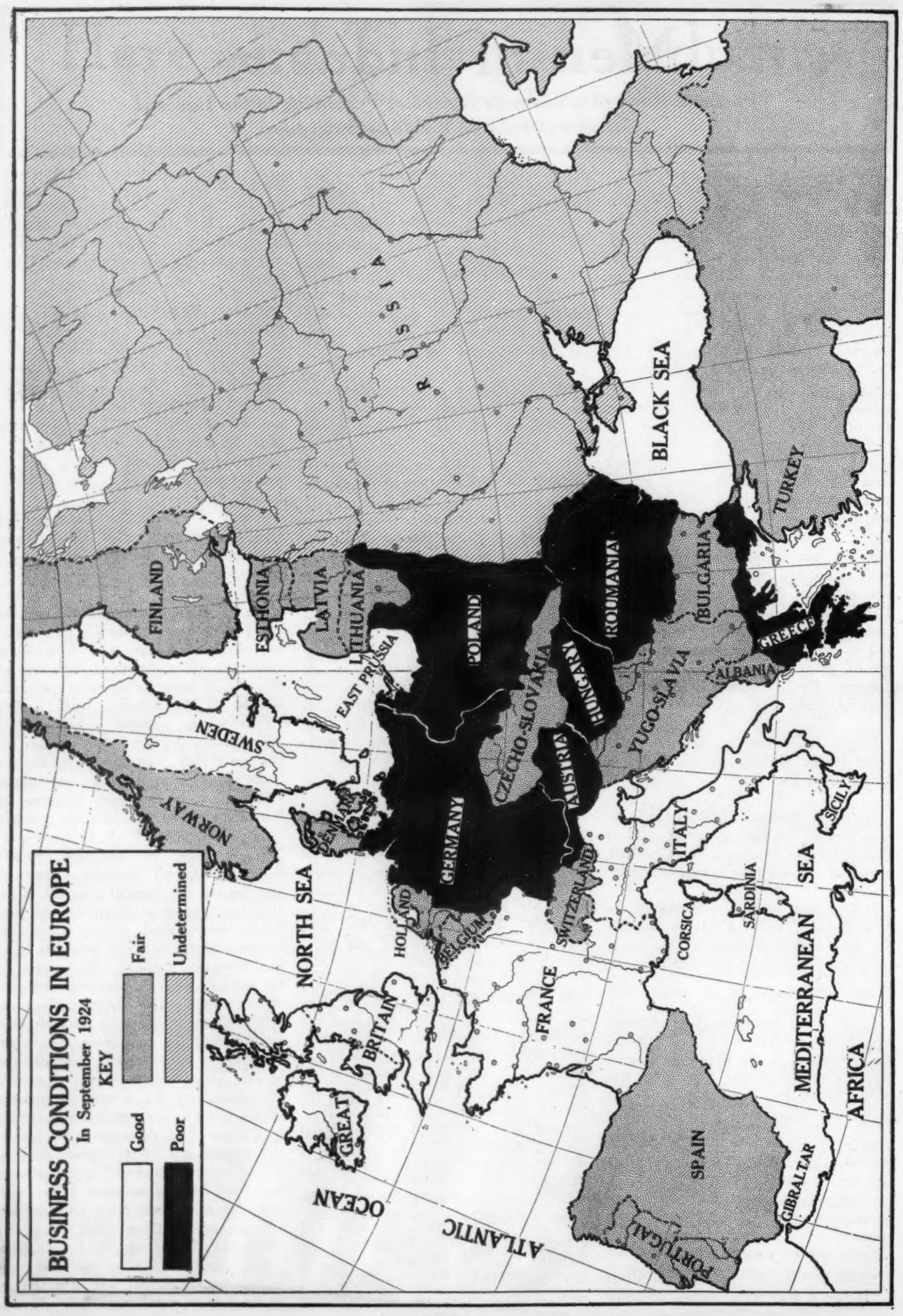
Francis Y. Casey, for the past five years assistant manager of sales has been appointed sales manager of W. J. Rainey, Inc.

* * *

Uri T. Hungerford, chairman of the board of directors of the U. T. Hungerford Brass & Copper Co., New York, celebrated his eighty-third birthday on Dec. 14. In honor of the event the stockholders of the company with a few invited guests tendered a luncheon to Mr. Hungerford on Dec. 18 at the Hardware club, New York. At 83, Mr. Hungerford is as vigorous and keenly interested in his extensive business affairs as when he was 20 years younger.

* * *

W. M. Corse, who has been affiliated with the National Research Council in carrying out the financial program to defray the expense of compiling and publishing international critical tables, has become affiliated with the Research Service, Investment building, Washington, in the capacity of vice president and general manager. This bureau offers expert engineering service in the civil engineering field, in nonferrous metallurgy, in personnel administration, informational service in connection with the various departments of the federal government, liaison service for establishing contact with government departments on legislative matters and other contracts pertaining to material purchased by the government and in representation before congress for government, civic, industrial and business organizations. Mr. Corse formerly was affiliated with the Lumen Bearing Co., Buffalo. He has conducted many independent researches and investigations in the field of metallurgy.


BUSINESS CONDITIONS IN EUROPE
In September 1924
KEY
Good
Fair
Poor
Undetermined
RUSSIA
BLACK SEA
TURKEY
FINLAND
ESTHONIA
LATVIA
LITHUANIA
EAST PRUSSIA
POLAND
ROUMANIA
BULGARIA
GREECE
ALBANIA
SWEDEN
NORWAY
CZECHO-SLOVAKIA
HUNGARY
YUGOSLAVIA
AUSTRIA
GERMANY
SWITZERLAND
ITALY
SICILY
NORTH SEA
HOLLAND
BELGIUM
FRANCE
CORSICA
SARDINIA
MEDITERRANEAN SEA
GREAT BRITAIN
SPAIN
PORTUGAL
GIBRALTAR
AFRICA
ATLANTIC OCEAN

European Outlook More Cheering

British Business Conditions Are Improving—Continental Iron and Steel Production Has Attained High Levels—Germany Is Reviving Prospects Indicate Keener Competition in Steel

BY VINCENT DELPORT

THE gloomy atmosphere which pervaded Europe during the main part of 1924 lifted to a certain extent at the end of the year, and the outlook for 1925 appears to be more cheerful. A general desire for peace and for the resumption of normal business conditions is slowly spreading, creating a favorable atmosphere for the conclusion. of arrangements which would cover at least a period of years, thus preparing the way for future final settlements.

There still are many obstacles in the path, some of which will require time and skill to surmount, also many uncertainties, but there is now a better spirit of co-operation than has existed for a long time past and which, if developed, will tend to ease the way. It is also felt that America is interested in the re-establishment of European affairs and that the Atlantic is no unsurmountable barrier between the two continents.

Business in Great Britain, especially in the iron and steel field, has certainly improved. The recovery was of a sudden nature and happened immediately before the general elections which took place early in November, and when the Conservative victory was already evident. This meant, for the British business man, the elimination of new and strange policies and the return of stable political conditions supporting the industries of the coun. try.

Furnaces Are Relighted

Three furnaces were put on in November in the Barrow and Middlesbrough districts and others were getting ready. The lowest number of operating furnaces was reached on Sept. 30, the figure being 170. Pig iron production which had also attained its lowest level in September with 569,200 gross tons rose again to 586,400 tons in October with a steadily increasing tendency.

Exports of British iron and steel increased in October, the lowest figure having been reached in the preceeding month. Imports in October also increased and came only second to the figure for May. The heaviest American purchases of Middlesbrough pig iron for many months were registered in October and reached about 5000 tons.

India and Australia are raising tariff barriers against British steel, while the Conservative government has eliminated protectionism from its program. On the whole, Great Britain continues to travel an upward path with better prospects ahead than three months previously.

French Production Gains

France has made a step in arranging her financial difficulties. For the first time since the war a regular budget has been arrived at. At the end of the year French iron and steel production reached a level unrecorded in history and the average monthly output of pig iron and steel ingots during 1924 was in both instances from 46 to 48 per cent in excess of the 1913 monthly average. This is largely due to the output of the furnaces and mills in the recovered portion of Lorraine.

Coke supplies are also sufficient and the domestic production is increasing. Whereas iron and steel prices had continuously dropped since the summer, a decided turn took place at the end of November. However, France is coming to a point where she is compelled to export her surplus production of steel and she will be met more and more in the world export markets. In the course of the year tonnages of French pig iron and steel found an outlet in the United States and it is possible that the experience may be repeated in 1925. French iron and steel exports during the latter part of the year, although inferior to those of March and April were rising, and the balance of trade generally was favorable.

In Belgium and Luxemburg conditions have not varied to a great extent since the summer. Pig iron and steel production in Belgium, steel production in Luxemburg, have also exceeded the prewar outputs, although naturally to a lesser extent than in France. The Luxemburg pig iron production although inferior to that of 1913 was the highest since the armistice. Belgian and Luxemburg iron and steel products were prominent on export markets and they undersold the products of England in that country's own market. Prices at the end of the year were more remunerative and the steel plants had satisfactory order books.

Germany is preparing to use every advantage which she may find in the operation of the Dawes scheme. Credit facilities are more easily obtainable and taxes have been reduced. Iron and steel prices are more remunerative than they were in the middle of the year and the pig iron and steel outputs for 1924 may both be esitmated to be the largest of any other European producing country.

General business conditions in other European countries have followed the trend which was apparent three months previously, excepting for a set-back in Austria in the shape of a general railroad strike which upset the economic life of the country. The outcome of the situation will show whether the new republic is really set on its feet again. Italy continues prosperous. The situation in Spain and Portugal is hardly better than in the summer and the Spanish iron and steel industries have shown little activity while imports of iron ore have not been up to expectations. Swedish conditions are mainly good and the unfavorable balance of trade of that country is decreasing. Notwithstanding restricted credits and the increased cost of living, Norwegian industries are satisfactory and in the new year it is possible that conditions in Norway will be listed as good; at present they may be considered as fair. The same conditions generally pertain to Denmark, Holland and Switzerland.

General Prospect Encourages

Generally speaking, European prospects at the opening of the year are encouraging and there will be many opportunities for an active intercourse of commercial relations between America and the old continent. With respect to iron and steel products, only small tonnages of European material can find their way to the United States, but the increasing European production practically bars the way to American steel in these countries while other world markets will become more and more competitive.

Loose Rolling Favored by Sheetmakers

(*Concluded from Page* 1711)

further processing will render it smooth and free from defects. At the charging end of this machine is a circular shaped wash tank into which a truck load of sheets direct from the sheet picklers are piled. The tank then is revolved through an arc of 180 degrees, the empty truck is displaced by another loaded truck and another batch of pickled sheets are placed in the wash tank. Meanwhile the operator is taking the sheets one at a time out of the wash tank and is placing them in the feed rolls of the scrubbing machine. This machine is equipped with motor driven circular brushes which scrub both the top and bottom surface of the sheets as they pass between. The sheets then enter a furnace through which they are conveyed slowly and finally ejected in a dry state.

A properly annealed sheet is hardened or tempered by cold rolling and for this purpose two trains of cold rolls of three stands each are provided. Each train is driven through reduction gears by a 300-horsepower motor. The sheets are given a pass through the No. 1 mill and then through the No. 2 unit according to the finish desired and then are returned to the annealing department for additional treatment. Cold rolling changes the grain structure of the steel, which, if not remedied, interferes with the forming operations. Hence, when sheets going through the mill are intended for deep drawing work they pass direct from the hot mill to a normalizing furnace, which is a gas fired unit about 50 feet long. The steel is conveyed over the hearth of this furnace at a predetermined speed and its temperature increased and lowered to certain degrees. From the furnace the sheets pass through a roller leveling machine and then are taken to the cold rolls. While cold rolling affects the grain structure of the steel that has been normalized, still a low temperature anneal following reduction on the cold rolls establishes a suitable structure for deep drawing purposes.

Sheets Are Rendered Flat

After the sheets are finished rolled and annealed they are passed singly through roller leveling machines which are equipped with about 17 rolls. Eight of these rollers form the top row and are arranged in a staggered position over the nine remaining rollers in the bottom row so that the sheets while in transit travel in a wave-like manner. The purpose of the roller leveling process is to remove whatever buckle that remains in the sheets. Stock ordered with a flat, high-finished surface is stretcher leveled. Both ends of the sheet are clamped in a drawing bed and the sheet is stretched by hydraulic pressure until flat.

To protect the steel from rusting during transportation, storing or handling, its surface is coated with a film of oil. The sheets are passed singly between two pairs of steel rolls covered with felt disks. These are mounted parallel to each other in suitable housings and bearings. A centrifugal pump enclosed in the gear housing forces the oil into separate manifolds which are positioned at a suitable distance above the top rolls. Each manifold is equipped with numerous pet cocks for controlling the quantity of oil fed to the felt disks. Both sets of rolls may be used for oiling or one set for oiling and the other for wiping. If specifications call for sheets square on all four corners they are resquared on shears designed for this purpose. The finishing department is equipped with two resquaring shears of 146-inch and 156-inch capacity. When the sheets are ordered slit to certain widths they are served to a rotary shear, the cut sections passing between a nest of rollers to remove the burrs left by the cutting wheels. Two depressed tracks enter the warehouse at the north end and these permit the spotting of box cars with their floors on the same level as the loading platforms.

Power is purchased from a public service company and enters the plant at 66,000 volts. Transformers reduce the voltage to 2200 for operating the hot mill motor and the two motors for driving the cold mill trains; and to 220 volts for operating the small motors and for lighting purposes. All high-tension lines of 2200-volts or more are painted a brilliant red color while all lines carrying 220-volt current are painted yellow for the convenience and safety of electrician in performing their various duties.

Obituaries

EMERY E. ELLIS, 54, president and general manager of the Union Tool Co., Orange, Mass., who died Nov. 15 at Gardner, Mass., following an operation for appendicitis, from his youth was deeply interested in mechanical work in all its branches. He was employed first by Brown & Sharpe Mfg. Co., Providence, R. I. Later he became associated with the Athol Machine Co., Athol, Mass., going from there to the Sawyer Tool Co., Fitchburg, Mass., as superintendent. Later Mr. Ellis formed the Union Caliper Co., Fitchburg, but subsequently removed the business to Orange. In 1908 the company was incorporated under the name of the Union Tool Co. Mr. Ellis was the owner of 26 different patents on tools. J. C. Bates, formerly associated with Mr. Ellis at the Sawyer Tool Co., Fitchburg, succeeds Mr. Ellis as general manager.

* * *

Alonzo W. Fisk Sr., president of the Fisk Machine Works, Brooklyn, N. Y., died Dec. 16, at his home in that city, following a stroke of apoplexy. Mr. Fisk, who was in his fifty-ninth year, was the inventor of an automatic box nailing machine.

* * *

Isaac H. Cohn, 48 years old and prominent iron and steel scrap man in St. Louis, was found shot to death in an automobile in Forest Park, that city, Dec. 16. Mr. Cohn was president of the National Steel Rail Co. and of the North American Electric Lamp Co.

* * *

Donald R. Krumhar, 29, former director of salesmen of the Parish & Bingham Corp., Cleveland, manufacturer of metal products, died Dec. 22 at his home in that city. Mr. Krumhar was an instructor in the government aviation training camp at San Antonio, Tex., for two years during the war.

* * *

Henry L. Badham, president of the Bessemer, Coal, Iron & Land Co., vice president of the Bessemer Galvanizing Co., vice president Nashville Bridge Co. and interested in other industrial companies of the Birmingham district, died Dec. 21, after an illness of a few weeks, following an operation for the removal of his tonsils.

* * *

Hubert S. Wyncoop, chief engineer in the inspection division of the department of water, gas and electricity, New York, died recently at his home in Queens Village, N. Y., aged 57 years. He was educated at Adelphi academy and Stevens institute, and engaged in railroad engineering with the Great Northern and Southwestern lines. He was a member of the American Society of Mechanical Engineers.

Machine Tools Await New Year

December Business of Fair Volume with Good Prospects for Material Increase in 1925—Export Buying Shows Slow but Steady Improvement—Used Equipment Sales in Better Volume—Crane Builders Finding More Activity

MACHINE tool markets await the New Year, holidays and inventories having taken the edge off of buying during the past week. Indications of 1925 business point to a material increase over the buying rate of late November and early December. The total business in this month will show a rising tendency toward the end of the month, many sales having been placed for billing after Jan. 1, payable from 1925 appropriations.

Export buying has shown slow but steady improvement, with a large order recently having been closed on lathes for shipment to Russia, this business going to a New England builder. The Amtorg Trading Co., New York, also has been an active buyer of export tools for Russia. Germany has purchased some equipment for production, but most of the recent sales to that country have been of single items for designing purposes.

Several railroad lists are pending, but action is slow and little in the way of orders is expected until after the holidays. In the Middle West the prospective demands of the Illinois Central for its contemplated shops at Markham yards features railroad inquiry. Several Northwestern roads also are expected as 1925 buyers. Industrial demands are limited to miscellaneous single tool purchases with the Patterson Foundry & Machinery Co., East Liverpool, O., a prospective buyer of about 12 tools.

School board inquiries continue to involve a considerable number of machines, with that of the Essex county vocational schools in New Jersey, taking about 40 tools. The list at Newark, N. J., also is expected to be closed shortly. Machinery requested by the board of education at Syracuse, N. Y., is expected to be rejected as not meeting specifications. Action is expected shortly on 24 lathes for Tilden Technical high school, Chicago.

Used equipment inquiries are much heavier and tools are moving in better volume, but lagging is noted in some sections and price weakness cuts into profits.

Among recent crane awards of interest are those booked by the Alliance Machine Co., Alliance, O., this company getting 18 for iron and steel companies within the past several weeks.

Prospective Railroad Business Aids Outlook

NEW YORK, Dec. 23.—Holiday dullness is reflected throughout the local machine tool market. While there are several small railroad lists pending, it appears doubtful if any of this business will be placed before the first of the year. Industrial interest is lacking with little even in the way of inquiry. Included in scattered orders are an 18-inch lathe for the Stamford Gas & Electric Co., Stamford, Conn., and a combination journal turning and axle lathe for the Illinois Central. Formal orders against the list of approximately 40 machine tools for the Essex County vocational schools for installation at Irvington, N. J., are expected to come out through the Newark, N. J., headquarters within the next few days. Action on a small list for the board of education, Newark, is also expected shortly.

While slow at the moment, export buying over the past month or so has shown a small but steady improvement. A recent outstanding order involves a substantial list of lathes for Russia, this business going to a New England builder. Other orders for this country have also been placed recently, the Amtorg Trading Co., 136 Liberty street, New York, being an active export buyer.

Orders for production equipment for Germany are also noted. Sometime ago representatives of a German manufacturing group were in this country. It was reported then that they desired to place their operations on a mass production basis, similar to that in this country. These interests placed some business at that time, and only recently have followed this up with other orders from Germany.

Southern Ohio manufacturers received orders for some of this equipment, including three production lathes and several centerless grinders. A Wisconsin builder received an order for internal grinders, possibly two machines, while an eastern builder is understood to have received a contract for a crankshaft grinder. Some other scattered orders for production equipment went to eastern companies.

Crane buying is light, although early action is expected on a sizable list for the General Electric Co., Schenectady, N. Y., and on five locomotive cranes for the Delaware, Lackawanna & Western railroad.

Inquiries Show Increase

CLEVELAND, Dec. 23.—Inquiries for machine tools show an increase in this district, indicating a better buying rate for 1925. Sales during the past two weeks were at a better level than in latter November and the first part of December. Many tools were closed during the past week for quick shipment, winding up 1924 budgets, and others were sold for delivery and billing in 1925, taking advantage of present prices and future appropriations.

One interest here sold several tools to railroads during the past week, among which was one machine to the New York Central. Automotive and industrial buying is quiet, with practically no demand from these sources in the city. Most of present activity is coming from outside territory.

Featuring crane awards recently in this district are the bookings of the Alliance Machine Co., Alliance, O. This interest has sold the following machines recently: Six 1½-ton special cranes and one 5-ton crane for the Niagara Electrolytic Iron Co., Niagara Falls, N. Y.; a 10-ton bucket crane, 10-ton magnet crane and a 40-ton crane for the Bethlehem Steel Co.; two 40-ton cranes for the Jones & Laughlin Steel Corp.; a 10-ton gantry crane for the Laclede Steel Co., Alton, Ill.; a 15-ton crane for the Otis Steel Co., Cleveland, and a soaking pit crane and gantry crane, to Worth Bros. Co. One of the largest recent awards booked by the Alliance company was for a 100-ton crane, 117-foot 3-inch span and an 8-ton crane, 58-foot span.

Railroad inquiry for reamers and drills is the heaviest in many weeks. More demand, in fact, appears to have come out in the last 10 days, than in the preceding four months altogether. One seller states that he recently had six railroad inquiries in one mail. This interest on the part of the railroad is taken as an expression of greater confidence in the future. Whereas through-

out the greater part of the year they have been buying these supplies on a hand-to-mouth basis, they now apparently are buying for stock as well as immediate requirements.

December business in the foundry equipment market in the Cleveland territory has been satisfactory. Substantial improvement was noted in the early month which continued even through the inventory period. While the demand 30 days ago seemed to center around molding machines, the sales for the past two weeks included in addition to molding machines, sand handling and mixing equipment, mold and core ovens, shakeout bails and kindred equipment.

Inquiries are out now in greater number than for some time, and repair work is heavy. One manufacturer is receiving numerous orders for spare parts to be shipped by express, which indicates a movement on the part of foundrymen to prepare for business which has been predicted will develop soon after the first of the year.

The Sawbrook Steel Casting Co., Cincinnati, has purchased a mold oven and car and the Royal Brass Co., Cleveland, has closed on six brass melting furnaces from the F. A. Coleman Co. The Standard Sand & Machine Co. has sold small sand mixing machines to the American Brakeshoe & Foundry Co., New York, for shipment to Kansas City, Mo., and the Weber Engine Co., Kansas City. The same manufacturer has sold a large machine with a capacity of 50 tons per hour to the Lamson Co., Syracuse, N. Y., for an installation at the plant of the General Fire Extinguisher Co., Warren, O. and also a large machine to the Link-Belt Co., Chicago, for an installation at the American Steel Foundries, Granite City, Ill.

It is expected that the machinery recently contracted for by the board of education at Syracuse, N. Y., will be rejected because specifications were not followed. Considerable mill room machinery is involved for the Roosevelt and Nottingham schools, including band saws, circular saws, mortiser surfacer, planers, drills, etc. Donald M. Kidd is superintendent.

Railroad Business Looming Up

CHICAGO, Dec. 23.—With the Illinois Central railroad preparing to go ahead with its large shops at the Markham yards, just south of Chicago, machinery dealers here are expecting some heavy business in 1925. The Pennsylvania railroad has come into the market for several shapers and lathes for its shops at Fort Wayne, Ind. Several of the northwestern roads are expected to be buyers of equipment soon after the turn of the year.

The Nash Motors Co. has placed eight shapers and a number of gear cutters with Chicago machinery houses. Several houses last week sold an exceptionally large number of punch presses. The Chicago board of education may take action tomorrow on 24 lathes for Tilden Technical high school but some sellers look for further delay.

The Patterson Foundry & Machinery Co., East Liverpool, O., has an inquiry in this market for a number of tools, most of which will be bought used if possible. The list includes an open side planer, a back geared shaper, a plain milling machine, a 20-inch plain drill press, a 26-inch back geared drill, a 3-foot radial drill, a 6-foot radial drill, an 8-foot boring mill and five lathes—18 inches x 10 feet, 24 inches x 12 feet, 36 inches x 14 feet, 48 inches x 14 feet and 72 inches x 20 feet.

December Business An Improvement

CINCINNATI, Dec. 23.—The closing week of December promises to be more fruitful as regards machine tool and equipment orders than were the first two weeks. Inquiries in hand are numerous and the number is being increased day by day. Most of these are for single machines, although several larger ones are current including one from a manufacturer in the Pittsburgh district for ten items. Sales the past week involved single units, with one or two exceptions. The G. A. Gray Co. received an order from the Miehle Printing Press Mfg. Co. at Chicago for three 72-inch planers, while the same company bought a 32-inch planer. The Cincinnati Planer Co. reports an order for a 48-inch planer from the Babcock & Wilcox Co., also orders for 22 and 42-inch machines. Included in the week's sales were boring mills, lathes and shapers. Inquiries from foreign countries also are increasing and the outlook for 1925 is quite promising. While the machine tool industry as a whole in this district operated between 40 and 50 per cent of capacity during the past year, the volume of business with most companies was satisfactory.

In the used market inquiries are much better and tools are moving in heavier volume.

Strong Inquiry for 1925

BOSTON, Dec. 23.—Sales of half a dozen used tools to a Connecticut manufacturer have served to stimulate the used tool market at Boston which previously had been suffering from the holiday lull. Several new plants and plant additions are under construction in Connecticut, and this state as a result constitutes a good potential buying power for 1925. At Boston new tool sales have been few and far between during the week, but the encouraging lists which came out the previous week have been augmented by further inquiry all of which is scheduled for purchase after Jan. 1. One Boston dealer reports having sold a heavy duty planer, but other than this sales have been for relatively light machines. A greater Boston district

Crane Awards and Inquiries of the Week

Orders Placed

Two 30-ton locomotive cranes for the Ford Motor Co., Detroit, to the Browning Co.

Two 25-ton cranes, 40 to 50-foot span, one motor and three motor respectively, and gates and gate hoists, for the Indiana Hydroelectric Co., Oakdale, Ind., awarded through Roger Freeman, New York, to the Whiting Corp.

Single Installations

30-ton used locomotive crane for H. Sosranscy Co., Allentown, Pa., scrap dealer, to the McMyler-Interstate Co.

25-ton locomotive crane for the Crane Co., Chicago, to the American Hoist & Derrick Co.

20-ton locomotive crane equipped with magnet, for the Spartansburg, S. C., plant of the Southern railway, to Industrial Works, this was previously noted as placed with an unnamed builder.

15-ton used locomotive crane for the Grove Stone Co., Ashville, S. C., to the Hoisting & Machinery Co., 50 Church street, New York.

12-ton used locomotive crane for the Louisiana Power Co., Monroe, La., to a local seller.

Small hoist and transfer crane for the Manifold Supplies Co., Third avenue, Brooklyn, N. Y., to A. D. Granger Co.

Used caterpillar crane for the Ebner Sons Co., Springfield. Mass., to unnamed seller.

Orders Pending

Five 20-ton locomotive cranes for the Delaware, Lackawanna & Western; action expected immediately.

Two 200-ton electric overhead cranes for the New York Edison Co., New York; award expected shortly by Thomas E. Murray, 55 Duane street, New York, consulting engineers; this inquiry, previously noted, has been pending for several weeks.

Two 20-ton handpower cranes for the Public Service Production Corp., Newark, for the Bath Portland Cement Co.; action held up until after the first of the year.

110-ton, 5-motor crane, 45-foot span, equipped with 15-ton auxiliary, for Columbus Electric Light & Power Co., Columbus, Ga.; Stone & Webster, Boston, closed bids Dec. 23.

10-ton gantry crane, 40-foot, 6-inch span, equipped with special trolley, for the Melrose yard of the New York Central railroad, New York; bids asked.

school bought three lathes. A Rhode Island textile mill purchased a lathe and a shaper. The Wheeldon Wire Co., West Brookfield, Mass., is in the market for tools and wire drawing equipment. Among other Massachusetts companies which will buy tools after the first of the year are the Coppus Engineering Corp., Worcester, the Oxford Granite & Marble Works, Oxford, Davis & Furber Machine Co., North Andover, and the General Electric Co. at Lynn.

The holiday season, true to expectations, brought out little business in the eastern foundry equipment market. Practically without exception, orders were of a small, scattered nature. While improvement is expected to set in following inventory season, there is still a lack of new inquiries which, as one indication, does not point to any large volume of business in the immediate future. The small volume of new inquiry, in fact, has been a source of disappointment to many in the trade.

The better tone in the iron and steel industry generally, however, is a source of optimism. It is believed that the improved operations at the steel plants will be reflected shortly at the foundries. Jobbing foundries in this district continue to operate at around 50 to 60 per cent with 50 per cent appearing to be the correct figure. At some of the specialty shops, such as the radiator, stove and pipe foundries, operations are higher.

Builders of cranes and hoisting equipment as a whole are finding business more active. Buying for the year just closed has been well under normal. Perhaps, the largest business came during the first couple months of 1924, while the smallest came in August. Since August, the trend has been upward, but has not reached a point comparable with the business done at the beginning of the year.

Construction and Enterprise

Concise and Timely Business Building Opportunities from the Field of Industry

BIRMINGHAM, ALA.—Alabama Stove Works, Inc., has been formed with $50,000 capital, to manufacture and deal in stoves, by D. O. Dortsch, A. T. Stanley and others.

BIRMINGHAM, ALA.—Rail-Joint-Nut-Lock & Safety Device Co. has been incorporated for $25,000 to manufacture railroad safety devices, with J. F. Williams as president, R. B. Moore, vice president and Miss Flossie V. Holmes as secretary and treasurer.

DECATUR, ALA.—Holland-Blow Stove Co. is inquiring for boiler and engine for new plant to replace that recently damaged by fire. J. N. Gibson is general manager.

LOS ANGELES—Weber Auto & Trailer Works, 1505 Santa Fe avenue, is in the market for a milling machine, according to reports.

LOS ANGELES—Pacific Tank & Pipe Co., 4820 Santa Fe avenue, will construct a 3-story structure at 1096 North Highland avenue for J. A. Tuthill.

LOS ANGELES—Lennox-Wallace Co., 7275 Fountain avenue. has been incorporated for $500,000 to manufacture gas and oil separators by Talbot Lennox and others.

LOS ANGELES—Elk Mfg. Co., 5012 South Main street, plans constructing 1-story, 75 x 100-foot plant for the manufacture of automobile bodies.

OAKLAND, CAL.—Fageol Motors Co., Hollywood and 107th avenues, is planning construction of a second unit addition to its present plant. The company also operates a plant at

(*Continued on Page* 1728)

Recent Industrial Business Changes

NORMA-Hoffman Bearings Corp., has moved its plant and general offices from Anable avenue, Long Island City, N. Y., to Stamford, Conn., where a modern plant has been completed on 17 acres adjoining the New York, NewHaven & Hartford railroad. The Norma-Hoffman company manufactures precision ball, roller and thrust bearings.

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Miles Machinery Co., 207 Bearinger building, Saginaw, Mich., dealer in new and used machinery has purchased the entire equipment of the Simplex Wire Wheel Co., Cadillac, Mich., and will offer equipment of the latter company for sale.

* * *

The Marr-Galbreath Machinery Co., Pittsburgh, Pa., will move to its new location at 58 Water street with warehouse through to First avenue, on or before Jan. 1, from 127 Water street. The new location will increase the company's space by about 100 per cent.

* * *

The Fogg Bedstead Co., a large manufacturer of iron and brass beds, formerly at Westboro, Mass., has moved its complete machinery and equipment to a new factory on Atlantic avenue, Boston. The deserted plant at Westboro is understood to be for sale or lease. This includes a modern foundry.

* * *

A. M. Castle & Co., Chicago, iron and steel jobbers have purchased the organization of Little & Robertson, Inc., Los Angeles, largest independent distributor of finished steel and iron products in southern California, according to W. B. Simpson, president of the Castle company. The Castle organization purchased the Berger & Carter Co., San Francisco, in September, and plans to construct a $500,000 plant. Five years ago the Castle company purchased the Western Hardware & Metals Co., breaking into the Northwest.

* * *

Presley Hamilton, Singer building, New York, has been appointed New York agent, effective Jan. 1, for the Fawcus Machine Co., Pittsburgh, manufacturer of herringbone gears, mill drives, etc. The company at the present time is represented by Robert C. Brown, 84 Pine street, New York.

* * *

Swartwout Co., Cleveland, manufacturer of industrial ovens, has appointed the Industrial Equipment Co., Jackson building, Buffalo, N. Y., as its representative in that territory, and has contracted with Joseph J. Beeman, 14559 Hubbell avenue, Detroit, for representation in the latter city.

Warehouse Steel Prices

Quotations at Cents Per Pound at Leading Market Centers

STEEL BARS

Boston	3.265c
Buffalo	3.30c
Chicago	3.00c
Cincinnati	3.30c
Cleveland	3.10c
Detroit	3.15c
Los Angeles	3.00c
New York	3.24c
Philadelphia	3.20c
Pittsburgh	2.90c
Portland	3.00c
San Francisco	2.85c
Seattle	3.25c
St. Louis	3.15c
St. Paul	3.25c

IRON BARS

Boston	3.265c
Buffalo	3.35c
Chicago	3.00c
Cincinnati	3.30c
Detroit	3.15c
New York	3.24c
Philadelphia	3.20c
St. Louis	3.15c

REINFORCING BARS

Boston	3.25c to 3.50c
Buffalo	3.40c
Chicago	2.60c
Cincinnati	3.30c
Cleveland	3.10c
Detroit	3.15c
Los Angeles, C. L.	3.60c
Los Angeles, L. C. L.	4.00c
New York	2.80c
Philadelphia	2.80c
Pittsburgh	2.25c to 2.40c
San Francisco, C. L.	3.35c
San Francisco, L. C. L.	3.80c
Seattle	3.50c

STANDARD STRUCTURAL SHAPES

Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland	3.20c
Detroit	3.25c
Los Angeles	3.00c
New York	3.34c
Philadelphia	2.90c to 3.10c
Pittsburgh	3.00c
Portland	3.00c
San Francisco	3.00c
Seattle	3.35c
St. Louis	3.25c
St. Paul	3.35c

PLATES

Boston	3.365c
Buffalo	3.40c
Chicago	3.10c
Cincinnati	3.40c
Cleveland, ¼-inch and thicker	3.20c
Cleveland, 3/16-inch	3.425c
Detroit	3.20c
Detroit, 3/16-inch	3.45c
Los Angeles	3.00c
New York	3.34c
Philadelphia	2.90c to 3.10c
Philadelphia, 3/16-inch	3.06c to 3.26c
Pittsburgh	3.00c
Portland	3.00c
San Francisco	3.00c
Seattle	3.25c
St. Louis	3.25c
St. Paul	3.35c

NO. 10 BLUE ANNEALED SHEETS

Boston, 3/16-inch	3.915c
Buffalo	4.05c
Chicago	3.80c
Cincinnati	3.90c
Cleveland	3.45c to 3.76c
Detroit	3.95c
Los Angeles	4.05c
New York	3.89c
Philadelphia	3.75c
Portland	4.50c
San Francisco	3.95c
Seattle	4.50c
St. Louis	3.90c
St. Paul	4.05c

NO. 28 BLACK SHEETS

Boston	5.10c
Buffalo	4.75c
Chicago	4.50c
Cincinnati	4.55c
Cleveland	4.35c to 4.55c
Detroit	4.65c
Los Angeles	5.15c
New York	4.60c
Philadelphia	4.85c
Portland	5.00c
San Francisco	5.00c
Seattle	5.50c
St. Louis	4.65c
St. Paul	4.85c

NO. 28 GALVANIZED SHEETS

Boston	6.15c
Buffalo	5.85c
Chicago	5.50c
Cincinnati	5.65c
Cleveland	5.45c to 5.65c
Detroit	5.75c
Los Angeles	6.00c
New York	5.60c
Philadelphia	6.00c
Portland	6.00c
San Francisco	5.90c
Seattle	6.50c
St. Louis	5.65c
St. Paul	5.65c to 5.90c

BANDS

Boston	4.015c
Buffalo	4.05c
Chicago	3.65c
Cincinnati	3.95c
Cleveland	3.85c
Detroit	3.80c
Los Angeles	4.00c
New York	3.99c
Philadelphia	3.95c
Pittsburgh	3.60c
Portland	4.00c
San Francisco	3.60c
Seattle	4.25c
St. Paul	3.90c

HOOPS

Boston	5.50c
Buffalo	4.40c
Chicago	4.15c
Cleveland, 1-inch and wider No. 20 and heavier	3.85c
Cleveland, narrower than 1-inch	4.35c
Detroit	4.30c
New York	4.49c
Philadelphia, ¾-inch and wider, 20 gage and heavier	3.95c
Philadelphia—narrower than ¾-inch	4.45c
Pittsburgh	3.60c
Seattle	5.00c
St. Paul	4.70c

COLD FINISHED STEEL

Boston (shapes)	4.65c
Boston (rounds)	4.15c
Buffalo (rounds)	4.20c
Buffalo (shapes)	4.70c
Chicago (shapes)	4.30c
Chicago (rounds)	3.80c
Cincinnati (rounds)	4.05c
Cincinnati (shapes)	4.55c
Cleveland (rounds)	4.00c
Cleveland (shapes)	4.50c
Detroit (rounds)	4.10c
Detroit (shapes)	4.60c
Los Angeles (rounds)	4.75c
New York (rounds)	4.15c
New York (shapes)	4.65c
Philadelphia (rounds)	4.15c
Philadelphia (shapes)	4.65c
Pittsburgh (rounds)	3.80c
Pittsburgh (sq. hex. and flats)	4.30c
Portland	4.50c
San Francisco (rounds)	5.25c
Seattle (rounds)	4.75c
St. Paul (rounds)	4.05c

WELDED PIPE

Discounts from warehouse, New York City

Standard Steel Pipe
(Subject to Shading)

	Black	Galvanized
⅛-⅜-inch butt	—31	+ 2
½-inch butt	—41	—24
¾-inch butt	—46	—32
1/3-inch butt	—48	—34
3½-inch lap	—44	—30
7-8-inch lap	—41	—11
9-10-inch lap	—35	— 8
11-12-inch lap	—34	— 6

Wrought Iron Pipe

	Black	Galvanized
⅛-⅜-inch butt	+44	+78
½-inch butt	— 4	+19
¾-inch butt	—11	+ 9
1-1½-inch butt	—14	+ 6
2-inch lap	— 5	+14
3-6-inch lap	—11	+ 6
7-12-inch lap	— 3	+16

Iron and Manganese Ores and Minerals

Iron Ore

LAKE SUPERIOR ORES

Per Gross Ton Lower Lake Ports

Old range bessemer, 55 per cent iron	$5.65
Mesabi bessemer, 55 per cent iron	5.40
Old Range nonbessemer, 51½ per cent iron	4.90
Mesabi nonbessemer, 51½ per cent iron	4.75

EASTERN LOCAL ORES

Cents per unit delivered at Eastern Pennsylvania and New Jersey furnaces

Foundry and basic 53 to 63 per cent	9.00 to 10.00
Copper free low phosphorus 53 to 65 per cent	nominal

FOREIGN IRON ORE

Cents per unit, c.i.f. Atlantic ports

Spanish low phosphorus, 52 to 54 per cent	9.50 to 10.00
Algerian low phosphorus, 52 to 54 per cent	10.50 to 11.00
Swedish and Norwegian low phosphorus, 68 per cent	11.00 to 11.50
Swedish foundry or basic, 66 to 68 per cent	9.00 to 10.00
Spanish foundry or basic, 50 to 54 per cent	8.00 to 9.00
Algerian foundry and basic, 50 to 54 per cent	8.00 to 9.00

Manganese Ore

Prices do not include duty at rate of 1 cent per pound of metallic manganese contained.

Brazilian, minimum 47 per cent....nominal
Indian, minimum 47 per cent....nominal
Caucasian, 53 to 55 per cent....
.....Ordinary, nominal c.i.f. tidewater
.....Washed, 42 cents c.i.f. tidewater

Fluor Spar

85 and 5 per cent grade

Washed gravel, Kentucky and Illinois mines, per net tone	$17.50 to 18.50
Washed gravel, imported duty paid eastern tidewater, per net ton	17.50 to 18.50

WABIK METAL

for Vitreous Enameling

SIGNS
Stove Door Panels: Splasher Backs: Broiler Pans: Table Tops: Refrigerators: and other Flat Work

Wabik Metal Sheets, like all other Mansfield Products, are rolled from our own "Bottom-poured Ingots." They are very low in sulphur.

Other Specialties:

Body Stock; Flat Fender and Hood Stock; Cowl Stock; Radiator Casing Stock; Crown Fender Stock.

METAL FURNITURE SHEETS
PICKELED and ANNEALED ENAMELING STOCK for Kitchen Utensils
MILK CAN STOCK

"Mansfield" Steel is the ultimate in Sheet Bars and in Sheets. It means satisfaction to all of the many users. Constant study of the needs of users, and continuous application of the results of such study, in the way of improved methods in our plants has established a reputation for unsurpassed reliability.

We invite your inquiries.

SHEET BARS and INGOTS

MANSFIELD SHEET & TIN PLATE COMPANY
MANSFIELD, OHIO

DISTRICT SALES REPRESENTATIVES

L. D. Rockwell Co., 1106 National City Bldg., New York, N. Y.
Mansfield Sheet & Tin Plate Co., 1372 Wrigley Bldg., Chicago, Ill.
Mansfield Sheet & Tin Plate Co., 12-237 General Motors Bldg., Detroit, Mich.
L. D. Rockwell Co., 2002 Union Trust Bldg., Cleveland, O.
Wm. L. Hoffman, 1504 West Venango St., Philadelphia, Pa.
C. H. Beach, 1403 Merchants Bank Bldg., Indianapolis, Ind.
Maynard French Steel Co., 710 Mercantile Library Bldg., Cincinnati, O.
A. P. Grenier, 640 Endicott Bldg., St. Paul, Minn.
Wm. P. Horn Co., 237 Rialto Bldg., San Francisco, Cal.
Wm. P. Horn Co., 509 Wilcox Bldg., Los Angeles, Cal.
Wm. P. Horn Co., 1426 L. C. Smith Bldg., Seattle, Wash.

Construction and Enterprise

(*Concluded from Page* 1725)

Kent, O.

SANTA CRUZ, CAL.—Santa Cruz county supervisors plan constructing shops to repair county road equipment. L. Bowman is county surveyor.

COLORADO SPRINGS, COLO.—Bids will be taken shortly for the construction of superstructure for the steam plant being built here. Considerable power plant equipment will be needed shortly.

SOUTH MANCHESTER, CONN.—Lockwood, Greene & Co., Boston, engineers, have awarded the general contract to the Manchester Construction Co. for a service building for the Manchester Memorial hospital. A power plant will be constructed later.

NAMPA, IDAHO—Union Pacific railway plans improvements and extensions to its machine shops, roundhouse, etc. Additional machinery and equipment will be needed.

CHICAGO—Argo Iron & Metal Co., 1662 Elston avenue, is to build a 3-story warehouse costing $90,000.

CHICAGO—American Insulated Wire & Cable Co., 954 West Twenty-first street, has leased a site for a new plant.

CHICAGO—Eastern Steam Laundry Co., Boston, has plans for a 1-story boiler house, 51x53-foot and an extension for which Lockwood, Greene & Co. are engineers.

CHICAGO—C. Hauber, 25 East Jackson boulevard, is about to award contracts for a 1-story foundry, 50x60 feet, to cost about $10,000.

CHICAGO—The Sinko Tool & Mfg. Co., 1632 North Halsted street, has awarded contracts to Ebenholtz & Jorgensen, 1720 North California street, for constructing a 1-story mill type plant.

CHICAGO—Railway Materials Co., 490 North Michigan boulevard, is reported as seeking an electric traveling crane for its branch at Stevens Point, Wis.

CHICAGO—D. S. Klafter, 64 West Randolph street, has been retained as architect for a 5-story, 75x100-foot garage and repair shop at 925 West Kinzie street for the Kinzie Building Corp.

CHICAGO—Monarch Radio Corp., 451 East Ohio street, has been incorporated for $100,000 and 1000 shares no par value stock, to manufacture and deal in iron, steel, copper, brass, bronze, etc., by Emil C. Wetten, Paul N. Dale and Jay T. Border.

CHICAGO—Bendix Corp., 231 South LaSalle street, has been incorporated for $2,900,000 to manufacture and deal in machinery, engines and automotive equipment, by Claud D. Raber, C. S. Anderson and H. J. Pickering. The Bendix Corp. is an interest of Mr. Bendix, inventor of a drive known by that name in automobile construction.

COLUMBUS, IND.—Dunlap & Co. plan constructing a 2-story, 60 x 150-foot machine shop.

BACK BAY, MASS.—S. W. Flax, 59 Queensbury street, is in the market for tools and equipment for an automobile service station and garage.

BOSTON—Barrett Co., 11 Beacon street, is inquiring for miscellaneous tools and equipment for a repair shop and service garage.

BOSTON—Western Electric Co. will construct a 5-story warehouse on Columbus avenue, for which Monks & Johnson are architects.

BOSTON—J. Shapiro & Son, 27 School street, have awarded contracts for constructing a repair shop and garage at 1168 Commonwealth avenue.

BRAINTREE, MASS.—Braintree Motors Co., Stedman street, is in the market for equipment for an automobile service station and garage.

CAMBRIDGE, MASS.—F. H. Davis, 175 Richdale avenue, is reported as seeking a screw cutting engine lathe.

CAMBRIDGE, MASS.—J. J. Shine, 1374 Massachusetts avenue, has plans for constructing a garage on Green street.

EAST SOMERVILLE, MASS.—Boston & Maine Railroad Co. has awarded contracts to Tredennick-Billings Co., Boston, for rebuilding the engine house recently damaged.

JAMAICA PLAIN, MASS.—P. J. Brady, 3722 Washington street, is in the market for miscellaneous tools to equip an automobile service station.

LAWRENCE, MASS.—The Archibald Wheel Co. has been incorporated with $200,000 capital to manufacture and deal in all kinds of vehicles and accessories, by Frank M. Andrew, T. Edwin Andrew and Albert A. Meader, all of Methuen, Mass.

SOMERSVILLE, MASS.—Ford Motor Co. plans constructing 1-story, 300x1600-foot assembling plant on Middlesex avenue. The building will be the first unit of a $4,000,000 project.

STOUGHTON, MASS.—The Greb Co., Inc., 173 State street, Boston, plans constructing a machine shop and plant.

WORCESTER, MASS.—Worcester Stamped Metal Co. has awarded contracts for constructing a 2-story, 40x105-foot plant. F. E. Billings is manager.

ELIZABETHPORT, N. J.—Singer Mfg. Co. has awarded contracts for constructing a 1-story addition to its mill.

ELIZABETHPORT, N. J.—A $50,000 mill addition will be erected by the Singer Mfg. Co.

JERSEY CITY, N. J.—Construction work on the Greenville yards of the Pennsylvania railroad is nearing completion. Capacity will be enlarged from 30 to 40 per cent.

JERSEY CITY, N. J.—A $200,000 power plant will be erected by the Standard Oil Co. of New Jersey, 26 Broadway, New York, at its refinery on Caven Point road.

NEWARK, N. J.—Western Electric Co. has filed plans for the erection of an additional group of buildings at its Kearny, N. J. works. This group will cost $2,500,000 or approximately one-third the cost of the entire works. It is expected the power plant and the first manufacturing units will be in operation Feb. 1.

BUFFALO, N. Y.—The board of education is in the market for a power operated machine for filing hand saws. Offices are in the Telephone building.

BUFFALO, N. Y.—Harding Mfg. Corp. has been organized with 250 shares $100 par value preferred and 500 shares no par common stock, to manufacture and deal in machinery and appliances, by L. A. Harding, T. Leach and R. Ulsh, with Slee, O'Brien & Hellings as attorneys.

COHOES, N. Y.—Mohawk Conduit Co. has filed incorporation papers with the secretary of state for $100,000 to manufacture iron and steel products. Directors are David B. Dawson, 150 Forrest avenue, Charles R. Lee, 139 Remsen street, and George E. Malone, 558 Second street, Troy.

FREEPORT, N. Y.—Nassau-Suffolk Steel Co. has been incorporated with 250 shares $100 par value preferred and 500 shares no par value common stock by F. S. Carr, W. J. Martin and W. E. Winne, 1275 Broadway, as attorney.

NEW YORK—Malone Iron Works has been incorporated for $5000 by G. N. and T. Malone and N. Covino, with H. A. Goidel, 291 Broadway, as attorney.

NEW YORK—Fox Foundry & Supply Corp. has been incorporated for $5000 by R. H. Law, J. Halliday and R. H. Law, Jr., 251 West Thirty-fourth street, attorney.

NEW YORK—Plans are being prepared by the United Metal Covered Door & Sash Co., 2052 Bronx street, for the replacement of the 3-story plant recently badly damaged by fire.

QUEENS, L. I., N. Y.—A. Litman Iron Works, Inc., has been incorporated with 100 shares no par value stock to manufacture and deal in iron and steel products, by C. S. Julien, Joseph M. O'Shea and P. K. Wiggins, 180 Montague street, Brooklyn, N. Y.

ALLIANCE, O.—The McCaskey Register Co. has completed purchase of eight acres in Mount Union for erecting a $1,000,000 plant.

CANTON, O.—G. Rubin has plans for constructing a 1-story, 50x200-foot garage on Market street. Stanley & Scheibel, 1301 Wick building, Youngstown, are architects.

CLEVELAND—Silberstein Rag, Iron & Metal Co. has been incorporated for $10,000 to deal in waste products, by Gertrude Hogan, Jones Abrams, S. Y. Allen, Max M. Dworken and Ella E. Butler.

MANSFIELD, O.—New Method Stove Co. has been incorporated with $325,000 preferred and 3250 shares no par value common stock, to manufacture and deal in stoves and other heating appliances, by H. H. Sanford, B. R. Ahrendt, E. D. Baxter, George A. Hoffman and Henry B. Sanford.

MASSILLON, O.—American Drilling Machine Co. plans constructing a 70x100-foot plant to cost approximately $75,000.

RAVENNA, O.—Wilcox Machine Co. has been incorporated for $20,000 to manufacture and deal in machinery, tools, etc., by C. F. Wilcox, E. L. Wilcox, J. L. Slates, N. J. Slates and A. L. Caris.

SALEM, OREG.—C. J. Pugh has purchased a site at South Twenty-first and State streets, where his company soon will construct a plant for the manufacture of canning machinery.

KENNETT SQUARE, PA.—American Road Machine Co., Commercial Trust building, Philadelphia, has awarded contracts for constructing a 1-story, 132x158-foot plant. William Steele & Sons Co., 219 North Broad street, Philadelphia, is architect and engineer. *Noted Nov.* 27.

LATROBE, PA.—J. B. Moore is in the market for chucks, drills and motors.

MILTON, PA.—American Car & Foundry Co. is to spend $25,000 for new equipment in enlarging its pressed steel department at its plant here. The new equipment will allow construction of larger tanks than now can be constructed.

PHILADELPHIA—The plant of Thomas Mills, 1911 North Eighth street, was damaged slightly by fire recently. The company manufactures tools.

PHILADELPHIA—H. B. Smith Co., Seventeenth and Arch streets, manufacturer of radiators, has awarded contracts for a 1 and 2-story, 85x200-foot plant and a 50x60-foot office.

PHILADELPHIA—The Atwater Kent Mfg. Co. has filed plans for a $500,000 addition to its plant only recently completed at Abbotsford road and Wissahickon avenue. The plans were made by the Ballinger Co.

PHILADELPHIA—Contract for the erection of a plant addition has just been awarded by the H. B. Smith Co., Seventeenth and Arch streets, manufacturer of boilers and radiators. The proposed construction includes a 1 and 2-story building, 86

x 200 feet, and 50 x 60 feet.

READING, PA.—The Spicer Mfg. Corp. has started work here on the erection of a plant for the production of automobile frames.

HILLSGROVE, R. I.—King Union Co., Inc., has been formed with 1000 shares common stock, no par value, to manufacture machine shop products, by James F. King, Jacob I. Fogel and Vincent I. McMahon.

PAWTUCKET, R. I.—William H. Haskell Mfg. Co. has awarded contracts to Willmarth & MacKillop, Inc., for an office and plant addition.

MEMPHIS, TENN.—E. L. Bruce & Co., Thoma street, is inquiring for used tools in best conditions, including a 24 x 24-inch x 12-foot planer, a 20 or 24-inch by 12-foot lathe, a universal milling machine and a 24-inch back geared sliding hand drill press.

EL PASO, TEX.—Hirsch Bros. Machinery Co., 1901 Bassett avenue, is reported as inquiring for automatic bar lathes for cutting steel bars, 1½ to 2-inch capacity; automatic chucking lathes, multiple drilling machines, cutters and tool grinders, cutters and reamers, boring mills and an open-side planer.

SEATTLE—Hofius Steel & Equipment Co. will award a contract shortly for constructing a 1-story, 45x139-foot frame construction plant.

SEATTLE—J. T. Heffernan and associates have purchased 1200 feet of waterfront industrial property valued at $450,000 for an industrial project as yet undisclosed. Mr. Heffernan is head of the Heffernan Engine Works and Heffernan Drydock Co.

KENOSHA, WIS.—Nash Motors Co. is reported as contemplating purchase of foundry equipment in addition to the large volume of machine tools and other items recently bought.

MADISON, WIS.—Madison Motor Car Co., 325 West Gorham street, has plans for constructing a 3-story, 60x210-foot garage and machine shop. F. Wooton is president.

MILWAUKEE—Peterson & Janssen, 1196 Fourth street, is in the market for die making machinery.

MILWAUKEE—Northern Realization Co., 1614 Fratney street, has awarded contracts for remodeling its plant. The company manufactures machinery.

MONROE, WIS.—E. Keel is in the market for a lathe, drill, and other equipment for an automobile service garage.

Business in Canada

NELSON, B. C.—Consolidated Mining & Smelting Co., Ltd., has prepared plans for a large ore mill at St. Eugene mine, Moyle Lake, to have a 500-ton a day capacity, and replacing a mill recently damaged by fire.

AMHERST, N. S.—Canadian Fireclay Refractories, Ltd., has been incorporated to manufacture and deal in silica rock, brick, and other minerals, etc., with $50,000 capital by Frank P. Hickey, Augustine Bradshaw and Augustine Dunn.

CLARK'S HARBOUR, N. A.—A. Maxwell will purchase machine tools and complete equipment for machine shop.

BELLEVILLE, ONT.—The Canadian Concrete Products Co., contemplates the erection of a manufacturing plant here to supply the Canadian market.

FORMOSA, ONT.—A. M. Poechmann is inquiring for miscellaneous tools and equipment for an automobile service station.

GALT, ONT.—P. W. Gardner & Son, Harris street, is inquiring for tools for equipping a machine shop, including lathes, drills, electrical equipment, etc.

HOLSTEIN, ONT.—Smith Bros. are in the market for general garage equipment and automobile repair shop tools.

LONDON, ONT.—Greers Carriage Factory, York and Talbot streets, is inquiring for machinery for the production of carriages, motor hearses, etc., to replace those recently damaged by fire. A. B. Greer is president and general manager.

MITCHELL, ONT.—The Mitchell Mfg. Co., is having plans prepared for the erection of a plant here to be 1-story, 100x450 feet, for the manufacture of concrete mixing and handling machinery. The plant will cost about $150,000.

MOUNT FOREST, ONT.—L. H. Pfaff is inquiring for miscellaneous tools and equipment for a garage.

OTTAWA, ONT.—Abitir Development Corp., has been incorporated to carry on the business of ore exploration, mining and reduction, with $600,000 capital stock by John L. McDougall, Ruby Russell, and Pearle M. Garrow.

OTTAWA, ONT.—The J. Alph. Langelier, Ltd., has been incorporated to manufacture and deal in plumbers supplies, sawmill supplies, barbed wire, lead pipe, etc., with $200,000 capital stock; by Joseph A. Langelier, Alan C. Fleming, Walter F. Schroeder and others.

SARNIA, ONT.—The Hydro Electric Power commission has purchased a site of eight acres here and will build transformer and distributing station. Building and equipment contracts will be let.

STAYNER, ONT.—F. J. Silverthorne is in the market for a drill press, lathe, etc.

STRATFORD, ONT.—The Brooks Steam Motors, Ltd., have been incorporated to manufacture automobiles, trucks, engines, etc., and to acquire and take over the Brooks Steam Motors, Ltd., with $250,000 capital stock; by Morley P. Van Der Voort, William R. Smyth, Edna M. Davis and others as provisonal directors.

TORONTO, ONT.—The Steel Co. of Canada, Ltd., Hamilton, Ont., has awarded additional contracts in connection with addition to its plant now underway at Swansea.

TORONTO, ONT.—Dominion Wheel & Foundry, Ltd., is reported as seeking a used locomotive or coach wheel lathe. F. J. Neale is vice president.

TORONTO, ONT.—Perfection Electric, Ltd., has been incorporated to manufacture and deal in electrical products and appliances, by Wilfred Crossen, James Graham and Thomas Evans.

TORONTO, ONT.—Queen City Hardware, Ltd., has been incorporated to manufacture and deal in hardware, plumbing and saw mill supplies with $50,000 capital, by George R. Morley, George T. Harkins and Daniel McIntyre.

TORONTO, ONT.—Electric Sales, Ltd., has been incorporated to manufacture and deal in electrical machinery and apparatus with $60,000 capital stock, by J. P. Jenner, Frank C. Teskey and James H. Bone.

TORONTO, ONT.—Keewalin-Akee Development Co., Ltd., has been incorporated to carry on business of mining, milling, reduction and developing ores, with $500,000 capital, by Wilfrid C. James, Graham T. Evans and Warwick H. Noble.

TORONTO, ONT.—Roller Casters, Ltd., has been incorporated to manufacture and deal in ball bearings, swivel casters, ball bearing casters, engines, etc., with $250,000 capital, by Nelson Schafer, Glen Dennis, Thomas Sachan and others.

TORONTO, ONT.—The Archer Radiator & Furnace, Ltd., has been incorporated to manufacture furnaces, radiators, stoves, hot water and electric heaters, etc., with $200,000 capital stock; by Newton C. Shaver, David J. Archer, Francis A. Ogletree and others.

TORONTO, ONT.—The Duplex Electric Sales, Ltd., has been incorporated to manufacture and deal in machinery, electrical supplies, equipment, etc., with $60,000 capital stock; by Wilfred J. P. Jenner, Frank C. Teskey, James H. Bone and others.

TORONTO, ONT.—D. Gestetner (Canada), Ltd., has been incorporated to manufacture duplicating machines, typewriters, calculating machines, etc., with $20,000 capital stock; by Mervil MacDonald, Geoffrey W. Adams, Percy E. F. Smiley and others.

TORONTO, ONT.—The Leaside Brick & Sand Co., Ltd., has been incorporated to establish a plant at Leaside, Ont., where it has obtained a site, to manufacture brick, tile, building material, etc., with $250,000 capital stock; by Arthur E. Hall, Charles D. Berg, Harry M. Terras and others.

WELLAND, ONT.—The plant of Just Lambert was damaged by fire here recently with heavy loss.

MONTREAL, QUE.—Central Quebec Light & Power Co., Ltd., has been incorporated with $350,000 capital, by Charles A. Barnard, William K. McKeown and Berthe Charlevois.

MONTREAL, QUE.—The Gledhill Co., Ltd., has been incorporated to manufacture and deal in machinery and appliances, with $500,000 capital, by Herbert S. Vipond, Ernest E. Vipond and Arthur R. W. Peinsoll.

MONTREAL, QUE.—Sargent-Howard-Latourelle, Ltd., has been incorporated to carry on the business of engineer, metal founder, metalworker, etc., with $50,000 capital, by Charles B. Howard, Sherbrooke; Grover S. Sargent and T. Latourelle.

MONTREAL, QUE.—The Acme Road Machinery Co. of Canada, Ltd., has been incorporated to manufacture road machinery, tools, implements, etc., with $50,000 capital stock; by Robert C. Hays, Reginald A. Cluff, of Goderich, Ont.

MONTREAL, QUE.—Craigulator Ltd., has been incorporated to manufacture heating equipment, furnaces, stoves, ranges, boilers, etc., by Nicholas Hennessy, Harry B. Meynell, both of Montreal; Harry Rose of Ste. Anne de Bellevue, Que.; James W. Craig, Providence, R. I., and others.

MONTREAL, QUE.—The Manchester Foundry Co., Ltd., has been incorporated to carry on general foundry business and to manufacture malleable iron, gray iron and steel, farming implements, machinery, metal goods, etc., with $100,000 capital stock; by Alfred Forest, Arthur Lalonde, of Montreal and Jeanne Emard of St. Lambert, Que.

MONTREAL, QUE.—Sargent-Howard-Latourelle, Ltd., have been incorporated to carry on business as metal founders, metal workers, etc., and to manufacture machinery, tools, implements, castings, iron and steel products, etc., with $50,000 capital stock; by Charles B. Howard of Sherbrooke, Que.; Grover S. Sargent of Pointe-Claire, Que.; Telesphore Latourelle and others of Montreal, Que.

Iron and Steel Scrap Prices

CORRECTED TO TUESDAY NOON GROSS TONS DELIVERED TO CONSUMER

Steel Works Scrap

HEAVY MELTING STEEL

Birmingham	15.00 to 15.50
Boston (dealers)	15.00 to 15.50
Buffalo	20.00 to 21.00
Chicago	19.50 to 20.00
Cleveland	19.00 to 19.50
Cincinnati (dealers)	16.00 to 16.50
Detroit (dealers)	15.00 to 15.50
Eastern Pennsylvania	20.00 to 21.00
New York (dealers)	15.00 to 16.00
Pittsburgh	21.50 to 22.00
St. Louis	17.00 to 17.50
Valleys	21.00 to 21.50
No. 1 railroad steel New York (dealers)	15.00 to 16.00

COMPRESSED SHEETS

Buffalo	18.00 to 18.50
Chicago	16.00 to 16.50
Cleveland	16.00 to 16.25
Detroit (dealers)	12.50 to 13.00
Pittsburgh	20.50 to 21.00
Valleys	18.00 to 18.50

BUNDLED SHEETS

Buffalo	15.50 to 16.00
Cincinnati (dealers)	12.50 to 13.00
Cleveland	14.50 to 15.25
Detroit	10.50 to 11.00
Eastern Pennsylvania	17.50 to 18.50
Pittsburgh	19.50 to 20.00
St. Louis	12.00 to 12.50
Valleys	16.00 to 16.50

SHEET CLIPPINGS, LOOSE

Chicago	12.75 to 13.00
Detroit	9.50 to 10.00

STEEL RAILS, SHORT

Birmingham	15.00 to 15.50
Detroit, No. 2	14.50 to 15.00
Chicago	21.50 to 22.00
Cincinnati (dealers)	17.00 to 17.50
Cleveland (over 6 ft.)	17.50 to 17.75
St. Louis	19.00 to 19.50

STOVE PLATE

Birmingham	15.00 to 16.00
Boston (consumers)	15.50 to 16.00
Buffalo	15.50 to 16.00
Chicago	19.00 to 19.50
Cincinnati (dealers)	12.50 to 13.00
Cleveland	15.50 to 16.00
Detroit (net tons) dealers	13.50 to 14.00
Eastern Pennsylvania	16.50 to 17.00
New York (dealers)	13.00 to 13.50
Pittsburgh	17.00 to 17.50
St. Louis	16.50 to 17.00

LOW PHOSPHORUS

Buffalo	23.00 to 23.50
Cincinnati((dealers)	18.00 to 18.50
Eastern Pennsylvania	23.00 to 24.00
Pitts. billet and bloom crops	26.50 to 27.50

SHOVELING STEEL

Chicago	19.25 to 19.75
Pittsburgh	15.00 to 15.50
St. Louis	16.50 to 17.00

KNUCKLES, COUPLERS, SPRINGS

Chicago	23.00 to 23.50
Eastern Pennsylvania	20.50 to 21.00
Pittsburgh	23.00 to 23.50
St. Louis	20.50 to 21.00

FROGS, SWITCHES, GUARDS

Chicago	19.75 to 20.25
Eastern Pennsylvania	19.00 to 20.00
St. Louis	18.00 to 18.50

BOILER PLATE, CUT

St. Louis	11.00 to 11.50

ANGLE BARS—STEEL

Buffalo	20.50 to 21.00
Chicago	20.00 to 20.50
St. Louis	18.00 to 18.50

Iron Mill Scrap

RAILROAD WROUGHT

Birmingham	14.00 to 15.00
Boston (dealers)	16.00 to 17.00
Buffalo No. 1	17.00 to 17.50
Buffalo No. 2	20.00 to 20.50
Cleveland, No. 1	16.25 to 16.50
Chicago, No. 1	19.25 to 19.75
Chicago, No. 2	19.50 to 20.00
Cincinnati, No. 1 (dealers)	14.00 to 14.50
Detroit, No. 2	15.00 to 15.50
Eastern Pennsylvania	20.00 to 21.00
New York, No. 1 (dealers)	16.50 to 17.00
Pitstburgh, No. 1	18.00 to 18.50
Pittsburgh, No. 2	21.50 to 22.00
St. Louis, No .1	17.00 to 17.50
St. Louis, No. 2	17.00 to 17.50

WROUGHT PIPE

Boston (dealers)	13.00 to 13.50
Buffalo	14.00 to 14.50
Eastern Pennsylvania	18.00 to 18.50
New York (dealers)	13.75 to 14.25

YARD WROUGHT

Boston	15.00 to 16.00
Eastern Pennsylvania	18.00 to 19.00

CITY WROUGHT

New York, long	15.50 to 16.00

BUSHELING

Buffalo	17.50 to 18.00
Chicago, No. 1	17.25 to 17.75
Chicago, No. 2	13.25 to 13.75
Cincinnati, No. 1 (dealers)	12.50 to 13.00
Cleveland, No. 1	16.00 to 16.25
Cleveland, No. 2	14.25 to 14.75
Detroit, No. 1	12.00 to 12.50
Detroit, No. 2 (new)	11.00 to 11.50
Detroit, No. 2 (old)	10.50 to 11.00
Eastern Pennsylvania	14.50 to 15.00
Pittsburgh, No. 1	17.50 to 18.00
St. Louis, No. 1	16.00 to 16.50

MACHINE SHOP TURNINGS

Birmingham	8.00 to 9.00
Boston (dealers)	12.00 to 12.50
Buffalo	14.00 to 14.50
Chicago	12.75 to 13.25
Cincinnati (dealers)	12.50 to 13.00
Cleveland	16.00 to 16.50
Detroit (dealers)	11.50 to 12.00
Eastern Pennsylvania	17.00 to 17.50
New York (dealers)	12.75 to 13.25
Pittsburgh	18.00 to 18.50
St. Louis	10.50 to 11.00
Valleys	15.50 to 15.75

CAST IRON BORINGS

Birmingham (chemical)	15.00 to 16.00
Birmingham (plain)	8.00 to 9.00
Boston (chemical)	16.00 to 16.50
Boston (dealers)	11.50 to 12.00
Buffalo	14.50 to 15.00
Chicago	14.75 to 15.25
Cincinnati (dealers)	12.50 to 13.00
Cleveland	16.25 to 16.50
Detroit (dealers)	11.50 to 12.00
Eastern Pennsylvania (chem.)	20.00 to 21.00
Eastern Pennsylvania	15.50 to 16.00
New York (dealers)	10.75 to 11.25
Pittsburgh	16.50 to 17.00
St. Louis	12.00 to 12.50
Valleys	16.50 to 17.00

MIXED BORINGS AND TURNINGS
For blast furnace use

Boston (dealers)	9.50 to 10.00
Cleveland	16.00 to 16.50
Detroit (dealers)	11.50 to 12.00
Eastern Pennsylvania	13.00 to 15.00
New York (dealers)	10.25 to 10.75
Pittsburgh	15.00 to 15.50

IRON AXLES

Birmingham	19.00 to 20.00
Boston (consumers)	31.00 to 32.00
Buffalo	26.50 to 27.00
Chicago	31.25 to 31.75
Cincinnati (dealers)	23.50 to 24.00
Eastern Pennsylvania	30.00
St. Louis	27.50 to 28.00

IRON RAILS

Buffalo	18.00 to 18.50
Chicago	19.00 to 19.50
Cincinnati (dealers)	14.00 to 14.50
St. Louis	18.00 to 18.50

PIPES AND FLUES

Chicago	15.25 to 15.75
Cincinnati (dealers)	10.50 to 11.00
Cleveland	14.50 to 15.00
St. Louis	13.50 to 14.00

RAILROAD GRATE BARS

Buffalo	15.50 to 16.00
Chicago	18.00 to 18.50
Cleveland	15.50 to 16.00
Eastern Pennsylvania	16.50 to 17.00
New York (dealers)	14.00 to 14.50
St. Louis	16.75 to 17.25

FORGE FLASHINGS

Boston (dealers)	12.00 to 12.50
Buffalo	15.00 to 15.50
Chicago	14.00 to 14.50
Cleveland (under 10 in.)	15.50 to 15.75
Cleveland (over 10 in.)	14.75 to 15.00
Detroit (dealers)	11.50 to 12.00
Pittsburgh	17.00 to 17.50

FORGE SCRAP

Boston (dealers)	12.00 to 12.50
Chicago	23.50 to 24.00
Eastern Pennsylvania	17.50 to 18.50

ARCH BARS AND TRANSOMS

Chicago	24.75 to 25.25
St. Louis	21.50 to 22.00

ANGLE BARS—IRON

Chicago	21.50 to 22.00
St. Louis	22.50 to 23.00

Iron and Steel Works Scrap

AXLE TURNINGS

Boston (dealers)	12.50 to 13.00
Buffalo	15.00 to 15.50
Chicago	17.00 to 17.50
Cleveland	16.50 to 16.75
Eastern Pennsylvania	18.00 to 18.50
Pittsburgh	18.50 to 19.00
St. Louis	13.00 to 13.50

STEEL CAR AXLES

Birmingham	18.00 to 19.00
Boston (consumers)	20.50 to 21.00
Buffalo	20.00 to 20.50
Chicago	23.50 to 24.00
Cleveland	19.50 to 20.00
Eastern Pennsylvania	25.00 to 26.00
Pittsburgh	22.50 to 23.00
St. Louis	22.25 to 22.75

SHAFTING

Boston (consumers)	21.00 to 21.50
Chicago	23.50 to 24.00
Eastern Pennsylvania	25.00 to 26.00
New York (dealers)	18.50 to 19.50
St. Louis	20.00 to 20.50

Iron Foundry Scrap

CAR WHEELS

Birmingham, tram car	17.00 to 17.50
Birmingham, iron	15.00 to 16.00
Boston (consumers)	18.00 to 19.00
Buffalo	20.00 to 20.50
Chicago, iron	20.50 to 21.00
Chicago, steel	22.50 to 23.00
Cincinnati	14.00 to 14.50
Eastern Pennsylvania	19.00 to 20.00
New York iron (dealers)	15.00 to 15.50
Pittsburgh, iron	20.50 to 21.00
Pittsburgh, steel	23.00 to 23.50
St. Louis, iron	19.50 to 20.00
St. Louis steel	20.50 to 21.00

NO. 1 CAST SCRAP

Birmingham, cupola	17.00 to 17.50
Boston (consumers)	19.50 to 20.00
Buffalo	18.25 to 18.75
Chicago, No. 1 machinery	22.00 to 22.50
Chicago No. 1 railroad or agricultural	20.50 to 21.00
Cincinnati No. 1 machinery cupola (net tons dealers)	20.00 to 20.50
Cleveland, cupola	20.00 to 20.50
Detroit (net tons) (dealers)	15.50 to 16.00
Eastern Pennsylvania, cupola	20.00 to 21.00
New York, cupola (dealers)	17.00 to 17.50
Pittsburgh, cupola	19.00 to 19.50
San Francisco, delivered	24.00
Seattle	18.00
St. Louis, railroad	20.00 to 20.50
St. Louis, agricultural	20.00 to 20.50
Valleys	19.50 to 19.75

HEAVY CAST

Boston (consumers)	17.00 to 17.50
Buffalo (breakable)	16.00 to 16.50
Cleveland	14.50 to 14.75
Detroit (automobile) (net ton)	15.50 to 16.00
Eastern Pennsylvania	18.50 to 19.00
New York (dealers)	16.00 to 16.50
Pittsburgh	18.50 to 19.00

MALLEABLE

Boston (railroad)	17.25 to 17.75
Buffalo	20.00 to 21.00
Chicago, railroad	20.75 to 21.25
Chicago, agricultural	18.50 to 19.00
Cincinnati, agricultural (dealers)	17.00 to 17.50
Cincinnati, railroad (dealers)	17.50 to 18.00
Cleveland, agricultural	19.00 to 19.25
Cleveland, railroad	19.75 to 20.00
Detroit (dealers)	16.00 to 16.50
Eastern Pennsylvania, railroad	16.50 to 17.00
Pittsburgh, railroad	21.50 to 22.00
St. Louis, agricultural	17.50 to 18.00
St. Louis, railroad	17.75 to 18.25

Miscellaneous Scrap

RAILS FOR ROLLING
5 feet and over

Birmingham tram car	15.50 to 16.50
Boston (dealers)	15.00 to 15.50
Chicago	20.75 to 21.25
Cleveland	19.00 to 19.50
Detroit	14.50 to 15.00
Eastern Pennsylvania	20.00 to 21.00
New York (dealers)	15.50 to 16.00
Pittsburgh district	22.50 to 23.00
St. Louis	19.00 to 19.50

LOCOMOTIVE TIRES

Chicago	20.50 to 21.00
St. Louis	19.00 to 19.50

LOW PHOSPHORUS PUNCHINGS

Chicago	20.50 to 21.00
Eastern Pennsylvania	22.00 to 24.00
Pittsburgh	24.50 to 25.00

A Year's Service—Not a Minute Lost Nor a Single Repair Made

Over a year ago the Bryden Neverslip Company bought a Brownhoist magnet crane. Subjected to continuous usage this crane has never lost a minute's time nor had a repair part put on it.

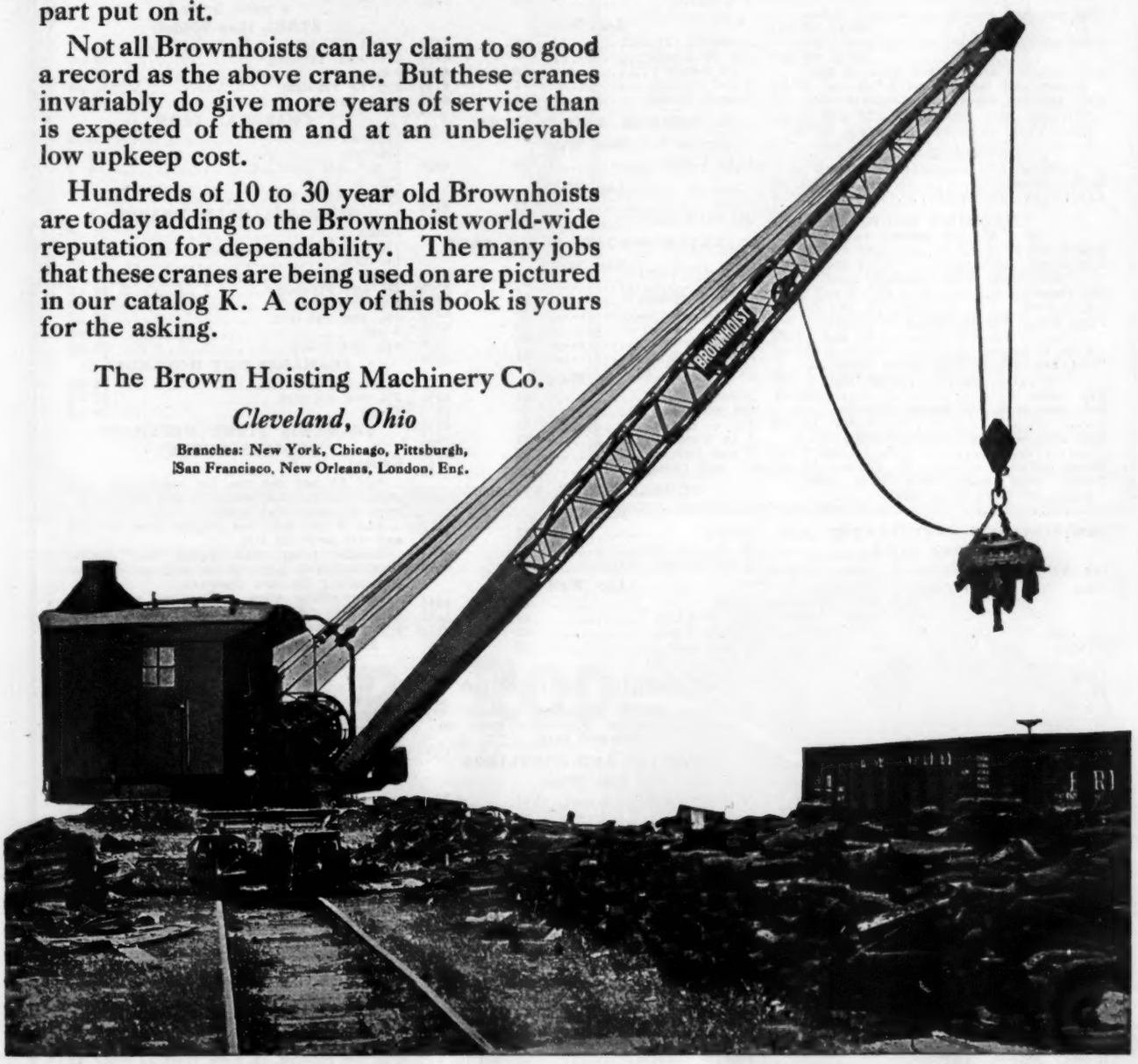
Not all Brownhoists can lay claim to so good a record as the above crane. But these cranes invariably do give more years of service than is expected of them and at an unbelievable low upkeep cost.

Hundreds of 10 to 30 year old Brownhoists are today adding to the Brownhoist world-wide reputation for dependability. The many jobs that these cranes are being used on are pictured in our catalog K. A copy of this book is yours for the asking.

The Brown Hoisting Machinery Co.

Cleveland, Ohio

Branches: New York, Chicago, Pittsburgh, San Francisco, New Orleans, London, Eng.



BROWNHOIST

MATERIAL HANDLING MACHINERY

Iron and Steel Prices

Nuts and Bolts

F.o.b. producer's plant freight allowed on 1000 pounds or more, substantially all points east of Mississippi and north of Ohio river.

Hot pressed square tapped or blank .....$4.00 off list
Hot pressed hexagon tapped or blank .....$4.40 off list
Cold punched square or hexagon blank .....$4.10 off list
Cold punched square or hexagon tap- .....$4.10 off list
Cold punched semifinished hexagon nuts ½-inch and larger ....75, 10 and 5 off
Cold punched semifinished hexagon nuts 9/16-inch and smaller..80, 10 and 5 off
Price f.o.b. Pittsburgh, packages of 50.

CARRIAGE BOLTS
(½ x 6", smaller and shorter)

Rolled thread .....50, 10 and 10 off
Cut thread (all sizes) .....50 and 10 off

MACHINE BOLTS
(½ x 4", hot pressed nuts)

Rolled thread .....60 and 10 off
Cut thread (all sizes) ....50, 10 and 10 off
(All sizes cold punched nuts)
Cut thread .....45, 10 and 5 off
Lag screws .....60, 10 and 10 off
Plow bolts Nos. 1, 2 and 3 heads.. ..... 50 and 10 off
4 to 10 heads .....50-10 + 20 off
*Flat and round head stove bolts.... .....80 and 5 off
Tap bolts .....30 off
Bolt ends with hot pressed nuts ....50, 10 and 10 off
Bolt ends with cold punched nuts ....45, 10 and 5 off
Blank bolts .....50, 10 and 10 off
Rough stud bolts with nuts (250 pieces or more of a size) ....40 and 10 off

SEMIFINISHED CASTELLATED AND SLOTTED NUTS

Per 1000, f.o.b. producer's plant, freight allowed

	S. A. E. Castellated	U. S. S. Slotted
¼	$ 4.40	$ 4.40
5/16	5.15	5.15
⅜	6.20	6.60
7/16	7.90	9.00
½	10.10	10.50
9/16	13.80	14.20
⅝	17.00	17.30
¾	23.50	24.00
⅞	36.00	36.00
1	55.50	58.00
1⅛	89.00	89.00
1¼	126.00	131.00
1⅜	183.50	183.50
1½	210.00	310.00

Larger sizes—Prices on application.

HEXAGON CAP AND SET SCREWS

Milled .....80, 10, and 10 off
Upset .....85, 10, 10 and 10 off
*F.o.b. producer's plant freight allowed on 300 pounds or more as above.

Rivets

Structural rivets, carloads Pittsburgh and Cleveland.. 2.60c
Structural rivets, carloads, Chicago 2.75c
Rivets, 7/16-in. and smaller Pittsburgh and Cleveland..70, 10 and 5 off
Rivets, 7/16-in. and smaller Chicago* .....70, 10 off
*Some makers quoting 70 off with freight allowed on 300 pounds or more.

Washers

Wrought, c. l., Chicago dist. .....$6 off
Wrought, c. l., Pitts. dist.....$6.00 off
Lock washers f.o.b. factory 85 and 5 off

Steel Pipe

Pittsburgh and Lorain basing discounts, jobbers' carloads.

Evanston, Ill., and Indiana Harbor, Ind., take differential 2 points less discount or $4 per ton higher net.

Chicago takes differential 2½ points less than Pittsburgh-Lorain basis or $5 per ton higher net.

Butt Weld

	Black	Galvanized
⅛-inch	45	19½
¼ and ⅜-inch	51	25½
½-inch	56	42½
¾-inch	60	48½
1 to 3-inch	62	50½

Lap Weld

2-inch	55	43½
2½ to 6-inch	59	47½
7 to 8-inch	56	43½
9 and 10-inch	54	41½
11 and 12-inch	53	40½

REAMED AND DRIFTED

Butt Weld

1 to 3-inch	60	48½

Lap Weld

2-inch	53	41½
2½ to 6-inch	57	45½

EXTRA STRONG—PLAIN ENDS

Butt Weld

⅛-inch	41	24½
¼ and ⅜-inch	47	30½
½-inch	53	42½
¾-inch	58	47½
1 to 1½-inch	60	49½
2 to 3-inch	61	50½

Lap Weld

2-inch	53	42½
2½ to 4-inch	57	46½
4½ to 6-inch	56	45½
7 to 8-inch	52	39½
9 and 10-inch	45	32½
11 and 12-inch	44	31½

DOUBLE EXTRA STRONG

Butt Weld

½-inch	42	32½
¾ to 1½-inch	45	35½
2 to 2½-inch	47	37½

Lap Weld

2-inch	41	32½
2½ to 4-inch	43	34½
4½ to 6-inch	42	33½
7 to 8-inch	38	25½

Wrought Iron Pipe

Pittsburgh basing discounts, jobbers' carloads. Individual quotations made on delivered basis

THREADS AND COUPLINGS

Butt Weld

¼ and ⅜-inch	+11	+39
½-inch	22	2
¾-inch	28	11
1 to 1½-inch	30	13

Lap Weld

1¼ and 1½-inch	Upon application	
2-inch	23	7
2½ to 6-inch	26	11
3 to 6-inch	28	13
7 to 12-inch	26	11

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG, PLAIN ENDS

Butt Weld

¼ and ⅜-inch	+19	+54
½-inch	21	7
¾-inch	28	12
1 to 1½-inch	30	14

Lap Weld

2-inch	23	9
2½ to 4-inch	29	15
4½ to 6-inch	28	14
7 to 8-inch	21	7
9 to 12-inch	16	2

DOUBLE EXTRA STRONG

Butt Weld

½-inch	+47½	+59½
½-inch	+28	+40
1-inch	+34	+40
1¼-inch	+28	+40
1½-inch	+27	+39

Lap Weld

2 and 2½ inches	+13	+25
3 to 4-inch	+ 8	+17
4½ to 6-inch	+ 9	+18
8-inch	+12	

Boiler Tubes

Pittsburgh less carload discounts. Carload 4 points larger

STEEL (Lap Welded)

2 and 2¼-inch	23 off
2½ and 2¾-inch	33 off
3-inch	36 off
3¼ to 3¾-inch	38½ off
4 to 13-inch	42 off

CHARCOAL IRON

1½-inch	+22
1¾-inch	+12
2 and 2¼-inch	+ 2
2½ to 3-inch	3
3¼ to 4½-inch	5

SEAMLESS COLD DRAWN*

1-inch	51 off
1¼ and 1½-inch	43 off
1¾-inch	27 off
2 and 2¼-inch	18 off
2½ and 2¾-inch	28 off
3 and 3¼-inch	32 off
3½ and 3¾-inch	33 off
4-inch	37 off
4½ and 5-inch	29 off

SEAMLESS HOT HOLLED*

3 and 3¼-inch	34 off
3½ and 3¾-inch	35 off
4-inch	39 off

SEAMLESS STEEL MERCHANT BOILER TUBES*

Extras:

Add $8 per net ton for more than four gages heavier than standard and add 10 per cent to theoretical weight.

Add 5 per cent for lengths over 24 feet and not over 26 feet.

Smaller tubes than 1-inch and lighter than standard gage to be sold at mechanical tubing list and discount.

Intermediate sizes and gages not listed above take price of next larger outside diameter and heavier gage.

SEAMLESS STEEL MECHANICAL TUBING*

Base Discounts

Carbon, 0.10 to 0.20 per cent ..... 83 off
Carbon, 0.30 to 0.40 per cent .... 81 off
Carbon, 0.40 to 0.50 per cent ....net price
Plus differentials and extras for cutting.

SEAMLESS STEEL LOCOMOTIVE AND SUPERHEATER TUBES*

Outside diameter	Gage	Net prices per foot f.o.b. Pittsburgh Price
2-inch	12-gage	15c
2-inch	12-gage	15c
2-inch	11-gage	16c
2-inch	10-gage	17c
2¼-inch	12-gage	17c
2¼-inch	11-gage	18c
2¼-inch	10-gage	20c
3-inch	7-gage	35c
1½-inch	9-gage	15c
5½-inch	9-gage	55c
5½-inch	9-gage	57c

Plus usual extras for forming and for long lengths.

*Published discounts are subject to considerable shading, in some cases as much as three to five extra 5 per cents.

Cast Iron Water Pipe

Prices per net ton

Class B Pipe

Four-inch, Chicago	$52.20
Six-inch and over, Chicago ..	48.20
Four-inch, Birmingham	44.00 to 44.50
Six-inch and over Birmingham	40.00 to 40.50
Four-inch, New York	60.50 to 61.60
Six-inch and over, New York	55.50 to 56.60

Standard fittings, Birmingham, base..$110.00
6 to 24-inch, base; over 24-inch, plus $20; 4-inch, plus $20; 3-inch, plus $20; gas pipe fittings, $5 higher.
Class A pipe is $5 higher than Class B.

GLOBE
POLISHED
DRILL RODS

Have a reputation for
QUALITY OF STEEL
ACCURACY TO SIZE
FINISH
and they live up to it

FIRTH-STERLING
STEEL COMPANY
McKeesport, Pa.

NEW YORK BOSTON HARTFORD
PHILADELPHIA CHICAGO CLEVELAND
DETROIT SAN FRANCISCO LOS ANGELES

ELECTRIC FURNACES

Keenly competitive markets and narrower margins of profits have thrown added responsibility upon the shoulders of manufacturers everywhere.

The cost of producing a given article must come down.

You are looking for a practical solution to this problem and no doubt have considered the high labor costs attendant upon all heating operations.

We do not offer electric furnaces as a solution to all of your heating problems; but we do say most emphatically that the use of electric heating furnaces will aid materially in establishing a better balance between the production cost and the selling price.

The broad and practical experience of our engineers, who have been the pioneers in this field, is always available to help you in securing the most efficient electric heating equipment.

GEORGE J. HAGAN COMPANY

Furnace and Combustion Engineers
Pittsburgh

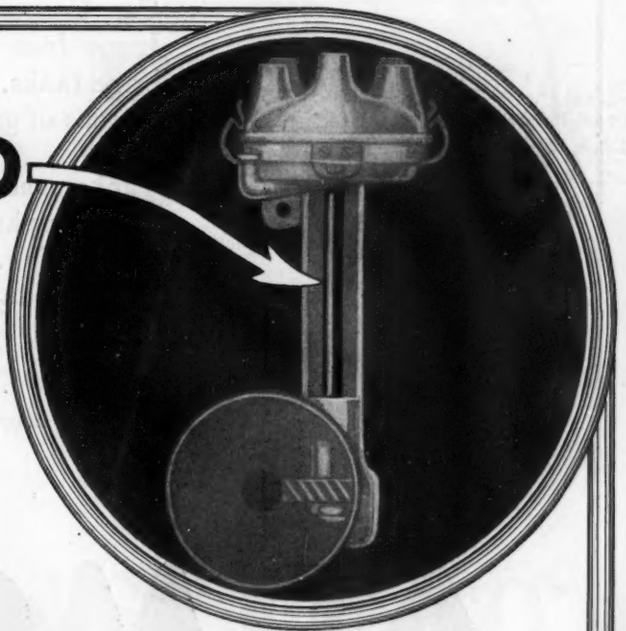
New York Detroit Los Angeles Chicago

Cold Drawn
JEWELERS ROD
Another Quality Product From
LANCASTER

A carefully selected stock, free of seams, pits and slivers. Your inquiry to our nearest office will be honored immediately.

COLD DRAWN WIRE & BARS
(Alloy and Carbon)

COLD ROLLED STRIP
(Any analysis—Any temper)



The shaft shown in the above ATWATER KENT FORD IGNITION UNIT is our special JEWELERS ROD stock.

LANCASTER STEEL PRODUCTS CORPORATION
MILLS LANCASTER, PA. U.S.A.

NEW YORK CLEVELAND BOSTON DETROIT
PHILADELPHIA NEW HAVEN SAN FRANCISCO

Armco and Railway *Refrigeration*

Early in 1923, the Kingan Refrigerator Line, Indianapolis, Indiana, awarded a contract for 100 refrigerator cars to the General American Tank Car Corporation. Engineers specified ARMCO Ingot *Iron* to be used in the construction of the brine tanks. In this installation there were used 76 tons of galvanized ARMCO Ingot *Iron*.

Tanks made of ARMCO Ingot *Iron* materially reduce upkeep, inasmuch as it is durable and long-lasting. This is the purest commercial iron produced in an open hearth furnace.

Send for booklet:

"When to use Commercially Pure Iron in Manufacturing"

ARMCO INGOT IRON

TRADE MARK

THE AMERICAN ROLLING MILL CO., Middletown, Ohio

(Export)

THE ARMCO INTERNATIONAL CORPORATION Cable Address—ARMCO, Middletown, Ohio

EVERY FACILITY

for highest quality and prompt service.

UNION DRAWN STEEL CO.

Warehouses: NEW YORK · PHILADELPHIA · CHICAGO · CINCINNATI · DETROIT

Sales Offices: BOSTON · BUFFALO · CLEVELAND

MILTON PRAY CO. · LOS ANGELES · SAN FRANCISCO · SEATTLE

Mills: BEAVER FALLS, PA. · GARY, IND.

BEAVER FALLS PENNA

Our Brands:

Refined
for ordinary use.

Vulcan
for special purposes

Vulcan Special
for engine bolts.

Vulcan XX
for stay bolts.

Vulcan Bloom
Special locomotive staybolt iron

To wholly preserve the high standard of quality that has always been recognized in *Vulcan Iron*, we will adhere to the old-fashioned method of puddling.

Vulcan Iron is made by the *quality* process, not the *quantity* process.

LOCKHART IRON & STEEL CO.
PITTSBURGH, PA.
VULCAN

Lewis Special
STAY BOLT IRON

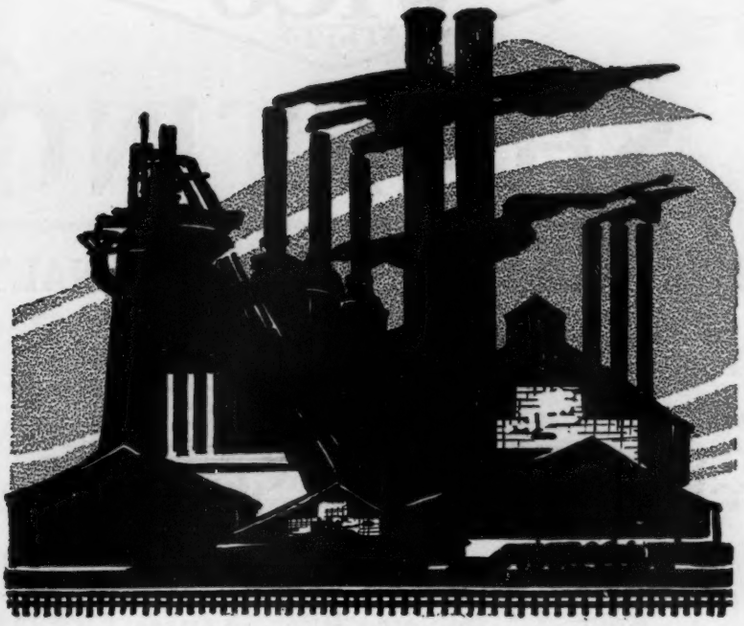
Following are *other* "LEWIS" Brands of High Grade Iron, "The Iron Superior"
LEWIS *SPECIAL* ENGINE BOLT IRON,
LEWIS ENGINE BOLT IRON;
LEWIS HOLLOW DRILLED STAY BOLTS, with 3/16" or 7/32" hole.

Penn Iron and Steel Company
Office and Works, Creighton, Pa. (Pittsburgh District)
SOLE SALES AGENTS:
JOSEPH T. RYERSON & SON, INC.
ESTABLISHED 1842
CHICAGO ST. LOUIS CINCINNATI DETROIT BUFFALO NEW YORK
BRANCH OFFICES: DENVER HOUSTON JERSEY CITY
MILWAUKEE MINNEAPOLIS NEWARK SAN FRANCISCO TULSA

"Penn" for QUALITY
Molds that Last Longer

INGOT MOLDS

The Penn Mold & Mfg. Co.
Works: Dover, Ohio
General Offices: Wheeling, W. Va.



WHEELING STEEL

Steel production embracing a wide variety of semi-finished and full-finished materials to serve industries

Pig Iron	Standard Pipe	Black Sheets
Billets and Slabs	Cut Nails	Galvanized Sheets
Plates	Wire Nails	Auto Body Sheets
Tie Plates	Wire and Rods	Furniture Sheets
Sheet Bars	Line Pipe	Electrical Sheets
Tin and Terne Plate	Tubing and Casing	Formed Roofings
	Blue Annealed Sheets	

WHEELING STEEL CORPORATION

WHEELING, WEST VIRGINIA

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Detroit: Book Building
Atlanta: Healey Building
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Boston: Massachusetts Trust Building
Kansas City: Dwight Building
Seattle: L. C. Smith Building
Dallas: Kirby Building
Cincinnati: Union Trust Building
San Francisco: Room 902, Rialto Building
St. Louis: Boatmen's Bank Building

WYCO STEELS

SHAFTING

STANDARD and SPECIAL ANALYSIS
AXLE STEELS
ALL GRADES

Wyckoff Drawn Steel Company

Mills: Ambridge, Pa. *General Offices:* Frick Building, Pittsburgh, Pa.
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Detroit Office and Warehouse: 6189 Hamilton Ave.

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Turned and Polished
SHAFTING
Milled Key Seats
at reasonable prices

Cold Drawn
Flats
Rounds
Squares
Hexagons
and Screw Stock

BLISS & LAUGHLIN, INC.
Established 1891
Mills and General Offices
HARVEY, ILLINOIS Chicago Phone: Pullman 6490
Chicago Warehouse
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MOLTRUP'S STEEL PRODUCTS

Have you a copy of this catalog?

It will explain to you why Moltrup Steel Products are celebrated for their quality and accuracy. And the next step, an order, will verify our statements.

Cold Drawn Steel in rounds, squares, hexagons, flats and special shapes:

Shafting; Screw Stock; Special Polished Rod; Machine Keys; Woodruff Keys; Machine Rack; Flattened Steel Plates for various uses.

Let us know your requirements

Moltrup Steel Products Co.
BEAVER FALLS, PA.
New York Office: Woolworth Building

DISTRICT OFFICES:

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Central Steel & Wire Co., Chicago & Detroit
H. D. Cushman Company, Cleveland
R. E. Murray & Co., 308 McKevitt Bldg., Norfolk, Va.
Union Iron & Steel Co., Cincinnati

One of Our 12-inch Bar Mills

What Steel Problem Confronts You?

WHAT part of your product needs greater strength, hardness or ductility? Perhaps some part should have greater resistance to wear or shock. Maybe it's a gear that is causing you trouble. Whatever your problem in steel may be, bring it to us. We maintain a large staff of expert metallurgists and practical steel men, having at their disposal one of the most completely equipped laboratories in the world, to help you solve your steel troubles. Perhaps one of the Agathon Alloy Steels we have in daily production will meet your needs exactly. Maybe your requirement calls for a special analysis. We'll formulate it without charge. Write us. Let us help you. Ask for our valuable book—"Agathon Alloy Steels."

We have daily production in all kinds of Agathon Alloy Steels such as—

Nickel, Chrome-Nickel, UMA, Molybdenum, Chrome-Molybdenum, Nickel-Molybdenum, Vanadium, Chrome-Vanadium, Chromium, etc.

Deliveries in Blooms, Billets, Slabs, Bars, Spring Flats, Hot Rolled Strips, etc.

THE CENTRAL STEEL COMPANY, Massillon, Ohio

Swetland Bldg., Cleveland
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AGATHON ALLOY STEELS

ILLINOIS ILLINOIS

Electric Steel

Steel of Quality and Uniformity

Standard Grades:

Special Carbon	Medium Nickel Chrome
Chrome Vanadium	High Nickel Chrome
Nickel	Low Nickel Chrome

Electric Steel is specified when high grade steel is essential, for such work as Gun Forgings, Automobile Parts, Turbine Wheels, Torpedo Heads, Roller Bearings, High Grade Tubes, etc.

The purity of Electric Steel enables the manufacturers to obtain a higher percentage of their finished product, thereby avoiding heavy losses on material on which heat treating, labor expense, etc., have been expended.

We are equipped to Anneal and Heat Treat when required.

Illinois Steel Company

General Office: 208 S. LaSalle Street
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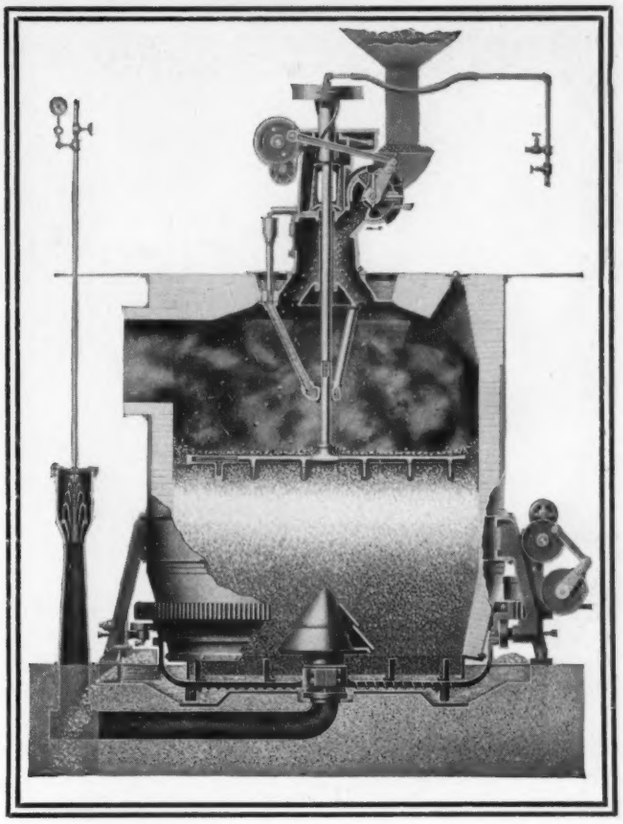
Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
Export Representatives: United States Steel Products Co., New York City

ILLINOIS ILLINOIS

Who Can Give Me the Latest Developments in Gas Producer Practice?

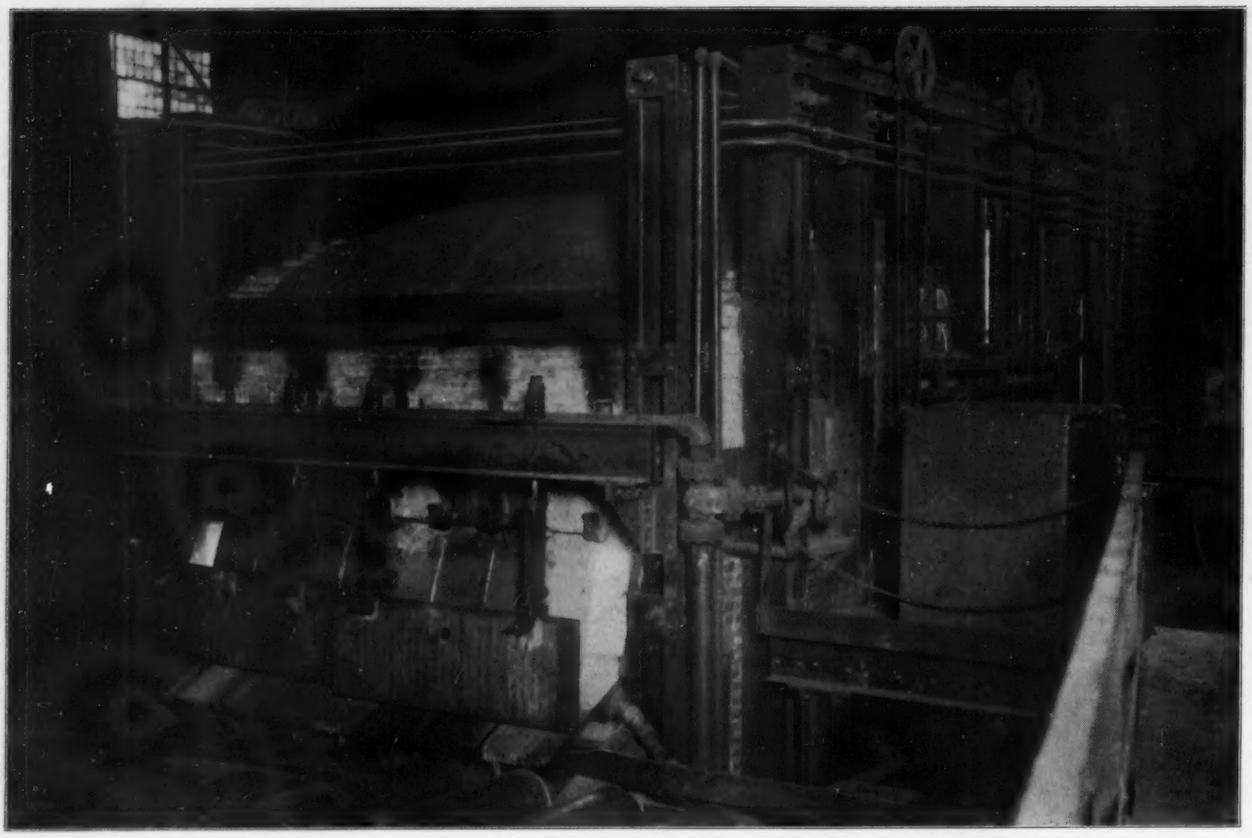


Doesn't it seem reasonable that you can rely upon the advice of an organization of technically trained engineers whose gas producer experience reaches back nearly a quarter of a century—an organization which does nothing but design gas producers and advise on complete producer gas installations? It is because so many have asked us to solve their producer gas problems both in this country and in Europe that we can point to over one thousand Chapman units installed during the past five years.

A Chapman full mechanical producer with every operation automatic and continuous is recommended where labor saving and efficiency of operation are dominant factors. Where it is more important to keep the investment low we furnish a lower priced semi-mechanical producer. Thus we are in position to recommend equipment to meet individual conditions.

A constantly expanding field of service has fitted us to give better and more up-to-date service on any gas producer problem.

The
CHAPMAN ENGINEERING CO.
C&G *Allied with The*
COOPER
MT. VERNON, OHIO
CO.
Since 1833 Engineers and Builders



Compare This With Your Furnace Operation

How Efficient is Your Furnace?

Of the B.T.U. fed into your furnaces how many actually get into the steel?

2,000 lbs. of steel at rolling temperature contain 650,000 B.T.U.

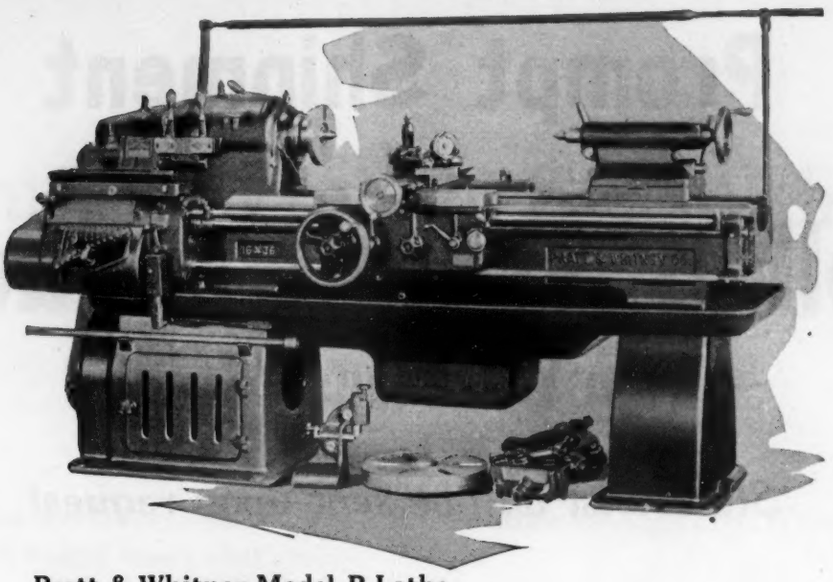
This amount of heat is the equivalent of:

4-3/5 gallons oil (150,000 per gal.)
65 lbs. of coal as producer gas
1,450 cu. ft. coke oven gas
600 cu. ft. natural gas

What Do Your Furnaces Show?

These figures represent 100% efficiency, which we would all like to obtain but cannot. The best our recuperative furnaces have obtained over long periods is 40 to 50% efficiency, with guaranteed results.

The
CHAPMAN-STEIN FURNACE CO.
C&G *Allied with The* COOPER CO.
MT. VERNON, OHIO
Since 1833 Engineers and Builders



Pratt & Whitney Model-B Lathe

Why Pratt & Whitney Use Chrome-Vanadium Steel

FOR the clash gears, clutches and heavy-duty springs of their well-known machine tools, Pratt & Whitney Company, Hartford, Conn., use Chrome-Vanadium Steel.

Some of their clash gears are heat-treated only to toughen, then cut, and burnished. Most of their clash gears, however, are hardened and then wheel ground to eliminate distortion resulting from hardening.

"Either type," writes Pratt & Whitney, "has the increased resistance to wear and fatigue of Chrome-Vanadium Steel. The cheaper means of obtaining proper heat-treatment is, of course, a factor in using Chrome-Vanadium Steel."

"Our other uses of Chrome-Vanadium, for clutches and springs, depend entirely on the steel's resistance to fatigue. Chrome-Vanadium's resistance to reversing strains and to shock are its best qualities."

"Forgings are more easily made from Chrome-Vanadium Steel, as it seems to work better under heat, and more uniform results are obtained due to the wide heating range. Chrome-Vanadium forgings machine a little easier than average alloy steel as they seem to be comparatively free from hard spots."

Aren't you, too, interested in a steel of greater toughness, strength and wear-resisting qualities, a steel that responds readily and with great uniformity to heat-treatment, a steel that will reduce your production costs? Our metallurgical staff will be glad to help you determine the exact steel for your service.

Vanadium Corporation of America

New York 120 Broadway

Detroit Book Bldg.

VANADIUM STEELS

for Strength, Toughness and Durability

Prompt Shipment
of
Rolled Steel Products
from Warehouse Stock

Stock List will be sent upon request

ILLINOIS STEEL WAREHOUSE CO.
Chicago St. Louis St. Paul

Carpenter Star-Zenith High-Speed Tool-Steel

When you buy CARPENTER STAR-ZENITH HIGH-SPEED TOOL-STEEL, you profit through our experience of thirty-five years in the art of making fine tool-steels.

STAR-ZENITH—constantly improved as demands of service increase—has a wide range of hardening-temperatures which adapts it for both heavy-duty and delicate finishing tools.

Complete stocks carried in our warehouses:

CHICAGO CLEVELAND DETROIT HARTFORD INDIANAPOLIS READING

THE CARPENTER STEEL COMPANY
READING, PA.

JONES & LAUGHLIN STEEL CORPORATION

Manufacturers of

VARIOUS STEEL PRODUCTS

District Offices

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Cincinnati	Minneapolis	Seattle
Cleveland	New York	Washington

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Eliza Furnaces and Coke Ovens

WAREHOUSES

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GENERAL OFFICES
Jones & Laughlin Building
PITTSBURGH

Carnegie Wrought Steel Wheels meet your requirements for industrial service

The enormous pressure under which Carnegie Wrought Steel Wheels are forged insure that

Carnegie Wheels are Safe

There is no possibility of blow holes, sand spots and other irregularities that cause failure. The metal is of a ductile (not brittle) character.

Carnegie Wheels give Service

In addition to forging under high pressure, the steel is thoroughly worked and rolled, resulting in a solid, homogeneous structure that resists wear.

The wrought steel wheel has distinct advantages for industrial purposes, particularly under heavy loading conditions in yards around mills, blast furnaces, etc. It is invaluable for use under ingot cars on account of its great strength—also under hot metal ladles as splashed molten metal cannot affect the integrity of the wheel. A flangeless type of wheel is made for use under factory trucks on floors where rails have not been installed.

Consult with our engineers. It will obligate you in no way.

CARNEGIE STEEL COMPANY
GENERAL OFFICES—CARNEGIE BUILDING
434 FIFTH AVENUE
PITTSBURGH, PA.

1729

"Special High Grade"

BASIC OPEN HEARTH STEEL

FORGING BILLETS

Nickel - Chrome Nickel - Vanadium
Chrome Vanadium - Chrome

SHEET BARS - SLABS

Special Steel for All Purposes

The Andrews Steel Co.

Newport, Ky., U. S. A.

District Sales Office. McCormick Bldg., Chicago

BLACK AND GALVANIZED STEEL

"GENUINE OPEN HEARTH IRON"
PURE IRON-COPPER ALLOY
RUST RESISTING

SHEETS AND FORMED PRODUCTS
ALL GAUGES, WIDTHS AND LENGTHS

Sheets for every Industrial use

WE GUARANTEE PROMPT SHIPMENTS

Newport Rolling Mill Company

Newport, Kentucky, U. S. A.

ALAN WOOD IRON AND STEEL CO.

Philadelphia Pennsylvania

San Francisco Los Angeles Dallas New York Boston Seattle

ALAN WOOD IRON & STEEL CO. ESTABLISHED A.W. TRADE MARK 1824 PHILADELPHIA

PIG IRON—BILLETS, BLOOMS AND SLABS
SHEARED PLATES
ROLLED STEEL FLOOR PLATES
BLUE ANNEALED STEEL SHEETS

INGOT-MOULDS

Direct or Cupola Metal—All Shapes and Sizes

SPRUE PLATES, RUNNERS AND FOUNTAINS

VALLEY MOULD AND IRON CORPORATION

General Office, SHARPSVILLE, PA.

Works { Sharpsville, Pa. / Josephine, Pa.

"The Largest Manufacturers of Ingot Moulds in the World"

MIDVALE

INGOTS

THE MIDVALE COMPANY
NICETOWN, PHILA., PA.

INGOTS

SQUARE—OCTAGON—CORRUGATED

SIZE	Weight of Cropped Ingot		Weight of Total Ingot with 15% Sinkhead		Length of Cropped Ingot	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
6¾" sq.	610	610	...	730	...	38"
8" "	700	870	825	1000	32"	40"
10¾" "	900	3600	1060	4240	21"	65"
18" "	3600	6200	4240	7300	36"	62"
9" Cor. or Dod.	1000	1230	1180	1450	48"	63"
11" "	790	2600	930	3060	24"	74"
14½" "	1550	4400	1825	5100	30"	79"
16" Oct.	2350	6700	2750	8000	36"	89"
21" "	4500	9700	5300	11500	40"	83"
24½" "	8800	32000	10350	37600	58"	176"
28¼" "	10200	45800	12000	54000	48"	182"
33½" "	18300	69125	21550	81400	64"	205"
37⅞" "	25000	90770	29400	107000	69"	216"
42½" "	33100	127345	38900	150000	73"	242"

Each ingot is designated by its smallest section and can be varied in weight, running from minimum to maximum, within usual weight tolerances for ingots. We can also offer blocks of any particular weight from any of the ingots listed.
As cast or cropped, top or bottom poured.

The actual weight you require for the forging you have to make; any composition.

THE MIDVALE COMPANY

WORKS AND MAIN OFFICE:

NICETOWN, PHILADELPHIA, PENNSYLVANIA

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165 Broadway	Grant & 5th Ave.	15th & H St. N.W.	925 Euclid Ave.	332 S. Michigan Ave.	681 Market St.

World's Largest Plate Mill

Largest boiler head, flanged in one piece, ever made.

This is the front head of a Marine Boiler. It was flanged from a flat circular plate 198¼" in diameter. It is not only a larger head than can be turned out by any other mill but is the largest head, outside diameter considered, which we have thus far turned out.

We Roll Plates up to 195" Wide

Heads Flanged in One Piece, up to 186" O. D.

Lukens Wide Plates will save you money in the fabrication of boilers, fireboxes, tanks, stills, etc., through reduction in number of seams and rivets, and lower labor costs. "Specify LUKENS Steel."

We can furnish rust resisting copper bearing steel.

Lukens Steel Company

Coatesville, Penna.

We were the FIRST to make Boiler Plates in America, and we are still FIRST in both size and quality of product.

ALLEGHENY

High Grade Electrical SHEETS for Transformers, Dynamos and Motors

Special Pickled and Cold Rolled Grades for Automobile Bodies

Metallic Furniture and all forms of Deep Stampings

Sheared Plates

3/16" and heavier up to 96" wide

Lap Welded Steel Boiler Tubes 2" to 6" O. D.

Heavy Steel Castings

Hot and Cold Pressed Stampings

Wrot Washers

ALLEGHENY STEEL COMPANY

PITTSBURGH, PA.

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501 Fifth Avenue
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BANKS E. EUDY
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CHICAGO, ILL.

SOLICITING AGENT
J. ALLAN ARMSTRONG
1426 Dime Bank Bldg. DETROIT, MICH.

SUPERIOR

HOT AND COLD ROLLED STRIP STEEL

Especially adapted for difficult drawing.
Uniform in quality and accurate to gauge.
Made in any degree of softness or hardness required.
Extra fine finish for plating.
Our motto is to produce the best and most uniform drawing steel manufactured.
Tell us your requirements.

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Mills—Carnegie, Pa.
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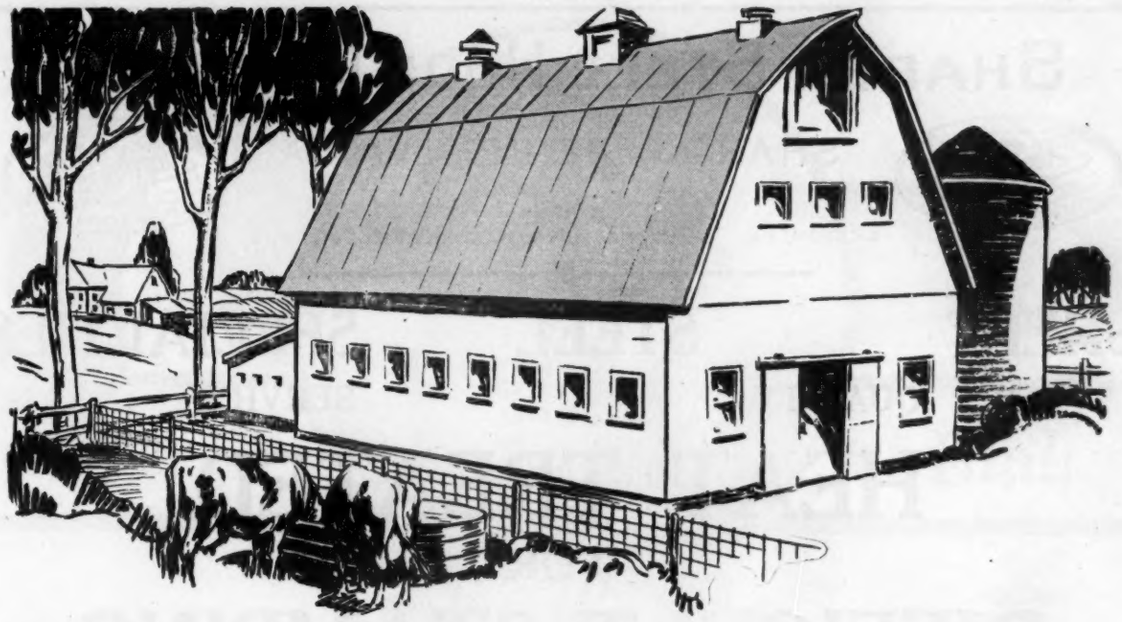
Hartford, Conn. — Hartford-Connecticut Trust Building
Philadelphia, Pa. — Widener Building
Chicago, Ill. — Steel Sales Corp., 120 So. Jefferson St.
New York City — W. H. Leonard & Co., 30 Howard St.



Sheet Metal Is a Savings Bank for the Farmer

THIS heading was not written by an advertisement writer, but by a farmer. He wrote it, not for an advertisement, but in reply to one of 10,000 questionnaires sent out to farmers all over the United States.

This Missouri farmer wrote also: "Galvanized corrugated sheets are used for roofing on most every farm in this district. I put on my barn second-hand sheets which had been used fifteen years previous and were just as good as new. I have used nothing but corrugated galvanized roofing on pitched roofs and have noticed the use of this material for twenty-five years. I consider it the cheapest and best roof that can be had."

This letter is typical of hundreds of the replies to these questionnaires. Sheet Steel roofs and siding for barns, corn cribs, granaries, hog and poultry houses, tool sheds and dwellings, are referred to frequently as having been in use for thirty years. Sheet Steel watering tanks and feeding troughs have been in service even longer. Sheet Steel linings for granaries, grain bins and corn cribs have paid for themselves many times over in stopping losses caused by rats.

To collect facts like these from original sources and to apply common sense in using these facts to build business for all who make or sell or use Sheet Steel—this is one of the purposes of the Trade Extension work of the Sheet Steel Industry.

How this plan is already operating to make more and better business for all is told in a booklet which will be of interest to you. Write for it now.

SHEET STEEL...
TRADE EXTENSION COMMITTEE

715 OLIVER BUILDING
PITTSBURGH PENNSYLVANIA

SHARON STEEL HOOP COMPANY

GENERAL OFFICE

SHARON PENNSYLVANIA

WORKS

SHARON, PA. YOUNGSTOWN, O. LOWELLVILLE, O.

SHEET STEEL SPECIALTIES

QUALITY SERVICE

HEAT TREATED FOR DIFFICULT STAMPING

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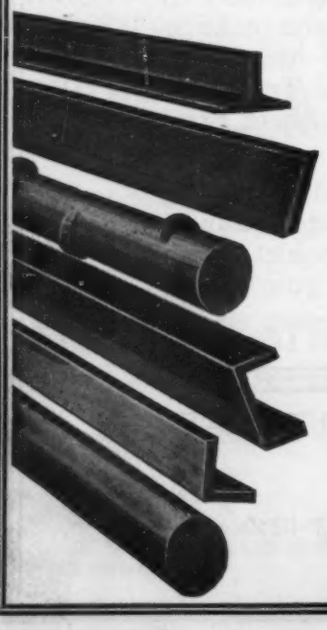
Cleveland.....Union Trust Bldg.	New York.....Canadian Pac. Bldg.	St. Louis.....Planters Bldg.
	Philadelphia.....Packard Bldg.	

CANADIAN REPRESENTATIVES

Hugh Russel & Sons, Ltd..... Toronto, Excelsior Life Bldg.....Montreal, Royal Insurance Bldg.

*

NO NEED to Look further for BARS - CHANNELS ANGLES - BANDS SPECIAL SHAPES



Let us know your requirements in LIGHT STEEL PRODUCTS

We shall be glad to serve you

Walsh & McGee Steel Co.

2 Rector St.

New York City

Rolling Mill at Tidewater, New York Harbor

WEIRTON STEEL CO.

GENERAL WEIRTON, W. VA. OFFICES

PLANTS LOCATED AT

Weirton, W. Va. Steubenville, O. Clarksburg, W. Va.

TIN PLATE

LACQUERED AND PLAIN

We also manufacture SHEET AND TIN MILL PRODUCTS for all purposes.—Black Sheets, Blue Annealed Sheets, Galvanized Sheets, Corrugated Sheets, V Crimped Sheets, Roll Roofing, Uniform Color Blued Stove Pipe Stock, Uniform Color Blued Elbow Stock, Enameling Stock, Show Card Stock, Milk Can Stock, Full Finished Black (Tin Mill Sizes), Coke Tin Plate, Best Cokes, Kanners Special Cokes, A-Charcoals, Copper Bearing Terne Plates.

STRIP STEEL in any degree of temper to satisfy all purposes of stamping and forming.

Uniform quality assured as each operation is under our complete control from the mining of our iron ore to finished marketable product.

BRANCH OFFICES

NEW YORK CHICAGO DETROIT PHILADELPHIA

No. 91 Little Giant Close Quarters Air Drill—Drills, reams and taps up to two inches. Reversible and non-reversible types. Request Bulletin 598.

The Illinois Merchants' Loan and Trust Building at LaSalle and Clark Streets, Chicago, Ill.

No. 2 Little Giant Air Drill—Sets a fast pace in drilling, reaming, tapping and numerous other operations. Ask for Bulletin 598.

Riveting 16,000 Tons of Steel

TEN Boyer Hammers and six Little Giant Air Drills were taken to LaSalle and Clark Streets, Chicago, Ill., by the Overland Construction Company, steel erectors, when they started the Illinois Merchants' Loan and Trust Building.

Previous experience with Boyer Riveting Hammers and Little Giant Air Drills on steel erection taught this company the better way to drill their holes and drive their rivets.

After driving 460,000 field rivets and drilling countless rivet holes, impossible for the fabricator to determine, the Overland Construction Company is more convinced than ever that Boyer Hammers and Little Giant Drills give steel erectors a continuous performance of practical economy and positive reliability.

Are they helping on your steel erection?

Chicago Pneumatic Tool Company

6 East 44th Street, NEW YORK, N. Y.

*Sales and *Service Branches all over the World*

*Birmingham	*Cleveland	Houston	*New York	Salt Lake City	Tulsa	*Buenos Aires	Dairen	Johannesburg	Milan	Paris	*Sao Paulo	Tokyo
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*Cincinnati	El Paso	*New Orleans	Richmond	*St Louis	Brussels	Durban	Honolulu	Manila	Osaka	Santiago	Tampico	*Winnipeg

Canadian Pneumatic Tool Company, Ltd., Montreal, manufacturers of Chicago Pneumatic products in Canada
Consolidated Pneumatic Tool Company, Ltd., London, manufacturers of Chicago Pneumatic products in England

P-198

BOYER PNEUMATIC HAMMERS·· LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS·· VACUUM PUMPS·· PNEUMATIC HOISTS
GIANT OIL AND GAS ENGINES ROCK DRILLS ·· COAL DRILLS

BOYER HAMMERS

The world's standard — *wherever rivets are driven*

THE TRUMBULL STEEL CO.

MANUFACTURERS OF

Hot and Cold Rolled STRIP
Blue, Black and Galvanized SHEETS
Tin Mill Black, TIN PLATE
ELECTRICAL SHEETS, Etc.

DISTRICT OFFICES
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Representatives
J. E. G. Coxwell, 40 Central St., Boston, Mass.

The Columbia Steel Company

COLD ROLLED STRIPS AND SHEETS
THE STANDARD OF QUALITY AND SERVICE

WIDE SIZE RANGE
½" TO 20" INCLUSIVE

Elyria, Ohio

SPECIALIZING IN
AUTOMOTIVE STEELS

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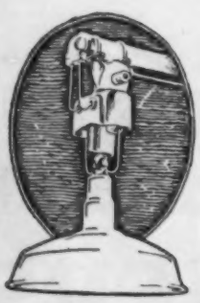
618 Book Bldg.	52 Vanderbilt Ave.	419 Ohio Bldg.	Prospect-Fourth Bldg.	1403 Merchant Bank Bldg.

The Lamp Cleaning Problem

is solved by the use of the

Thompson Safety Lowering Switch



—because it enables overhead lamps to be lowered away from the electric circuit for cleaning the reflectors or renewing bulbs.

THE ADVANTAGE IS OBVIOUS

It is inexpensive and easily included in present installations.
Illustrated booklet and complete information on request.

The Thompson Electric Company

226 St. Clair Ave. N. E. Cleveland, Ohio

-for your Technical Library

CHIEF ENGINEERS, SUPERINTENDENTS—in fact ALL power plant executives—will find this bulletin of unusual interest and value. It is not just "another bulletin" or a "piece of advertising" for general distribution. Rather, it is a 52-page handbook of information about pipe and piping as used in the modern power plant.

Listed below are chapter heads, tables and graphics which will give you an idea of the scope of this bulletin:

"NATIONAL" Pipe for Power Piping.

Specific Advantages.

Special Uses.

Use of Welding in Power Plant Piping.

Standard Types of Flanged Fittings.

Pipe Bends, Columns, Hand Railings.

Standard Specifications.

Weights, Dimensions, Test Pressures.

Saturated Steam.

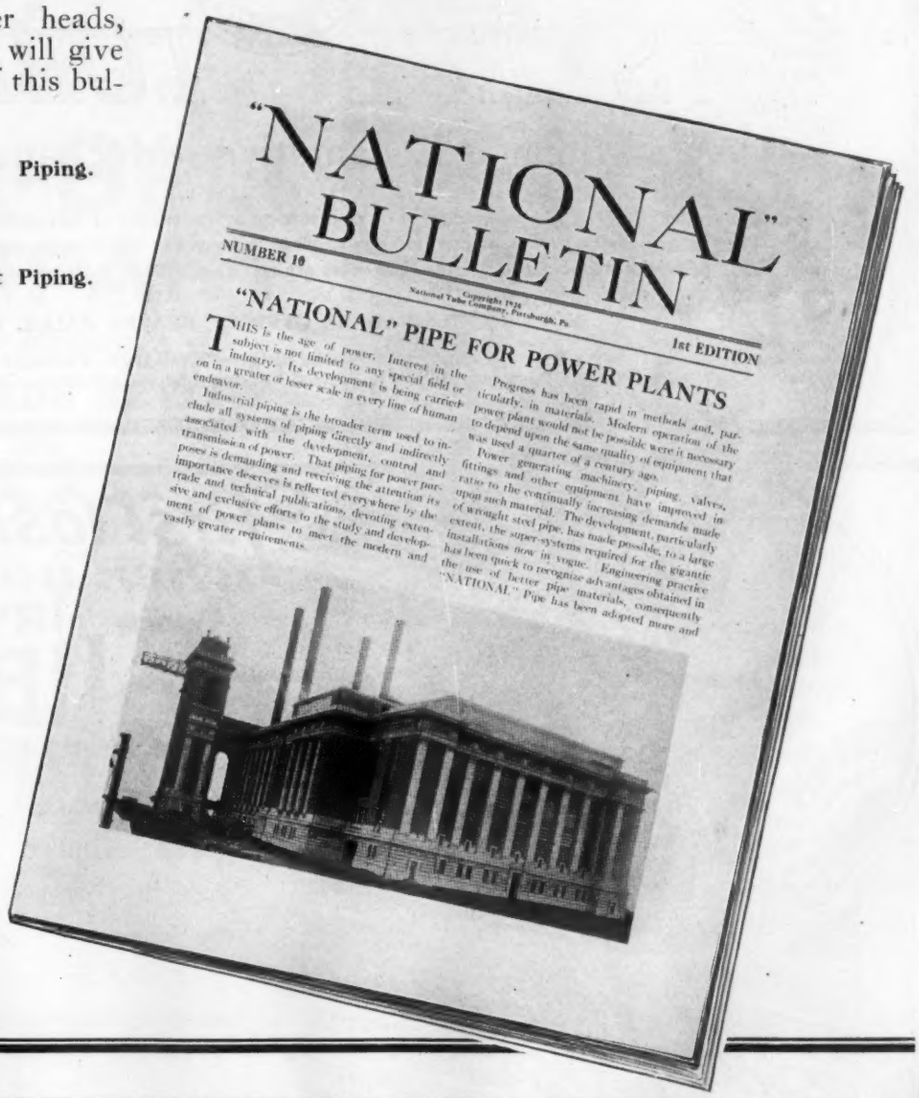
Superheated Steam.

Circumferences, Transverse Areas and Surfaces for Pipe.

Relative Discharging Capacities.

Flow of Steam—and Charts.

Calculation of Pipe Bends Chart.


"NATIONAL" BULLETIN

NUMBER 10

Copyright 1924 National Tube Company, Pittsburgh, Pa.

1st EDITION

"NATIONAL" PIPE FOR POWER PLANTS

THIS is the age of power. Interest in the subject is not limited to any special field or industry. Its development is being carried on in a greater or lesser scale in every line of human endeavor.

Industrial piping is the broader term used to include all systems of piping directly and indirectly associated with the development, control and transmission of power. That piping for power purposes is demanding and receiving the attention its importance deserves is reflected everywhere by the trade and technical publications, devoting extensive and exclusive efforts to the study and development of power plants to meet the modern and vastly greater requirements.

Progress has been rapid in methods and, particularly, in materials. Modern operation of the power plant would not be possible were it necessary to depend upon the same quality of equipment that was used a quarter of a century ago.

Power generating machinery, piping, valves, fittings and other equipment have improved in ratio to the continually increasing demands made upon such material. The development, particularly of wrought steel pipe, has made possible, to a large extent, the super-systems required for the gigantic installations now in vogue. Engineering practice has been quick to recognize advantages obtained in the use of better pipe materials, consequently "NATIONAL" Pipe has been adopted more and

In addition, this bulletin has 86 illustrations—and is in the convenient 8½ x 11 (filing) size.

NATIONAL TUBE COMPANY General Sales Offices FRICK BUILDING **PITTSBURGH, PA.**

Please send Bulletin No. 10 - "NATIONAL" Pipe for Power Plants to

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Boiler—Locomotive—Mechanical

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You pay for it only once—not over and over again, in repairs and replacements. If **Subway** cost four times what it does, it would still be the lowest-cost flooring for industrial use. All-steel, ever-wearing, time-proof, truck-proof, slip-proof, easily laid, easily rearranged if necessary—all this spells e-c-o-n-o-m-y. Think, too, of the accident insurance **Subway**—and **Safsteps** for stairs—gives you. Let us send Catalog 4A-32.

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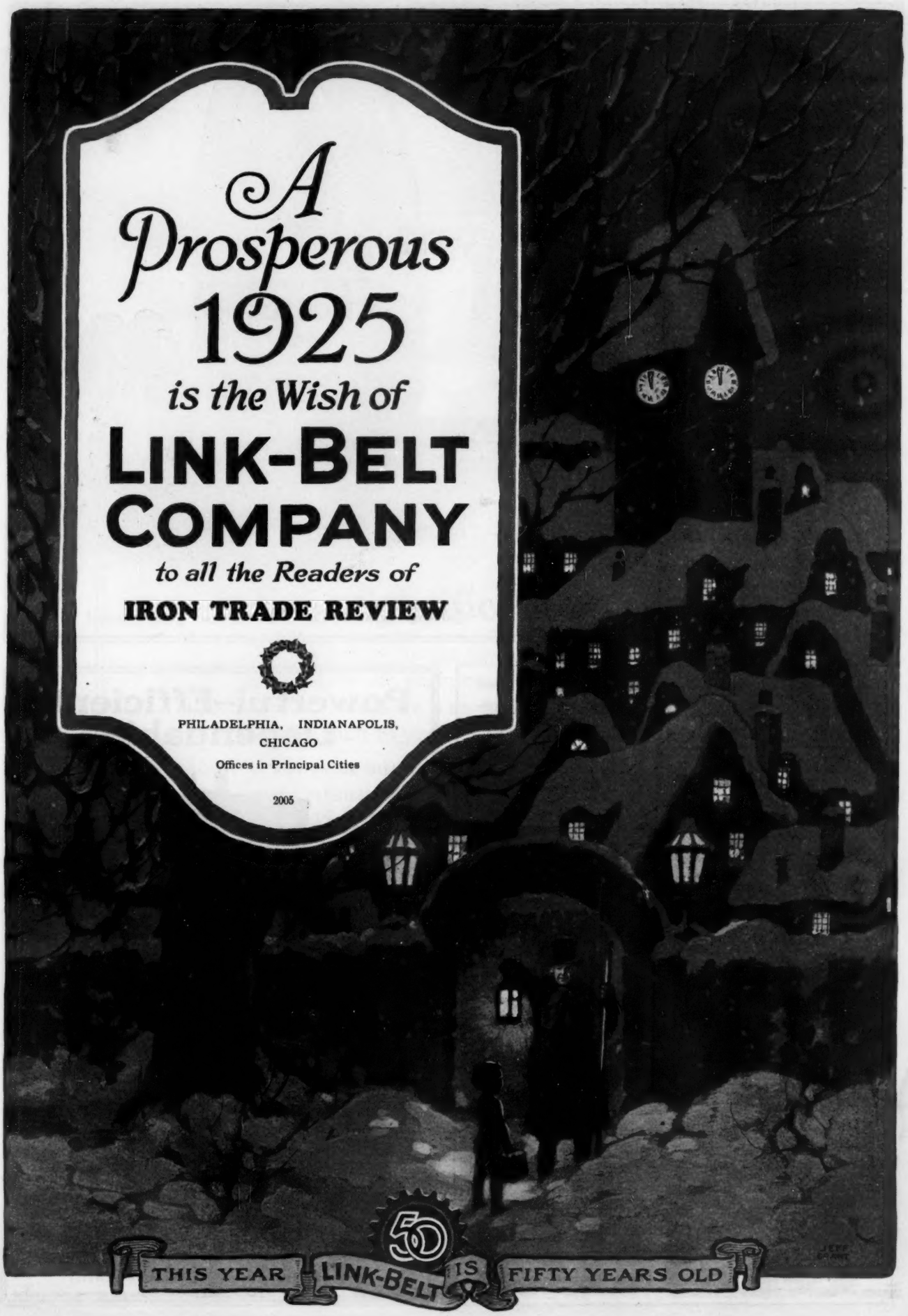
A Prosperous 1925
is the Wish of
LINK-BELT COMPANY
to all the Readers of
IRON TRADE REVIEW
PHILADELPHIA, INDIANAPOLIS, CHICAGO
Offices in Principal Cities
2005
50
THIS YEAR LINK-BELT IS FIFTY YEARS OLD

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is *down*
everything stops
except old
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STROH STEEL CRANE TRACK WHEELS
and save 'Crane maintenance; repairs and renewals'—

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—The last word in easy and economical operation

A type to suit all requirements.
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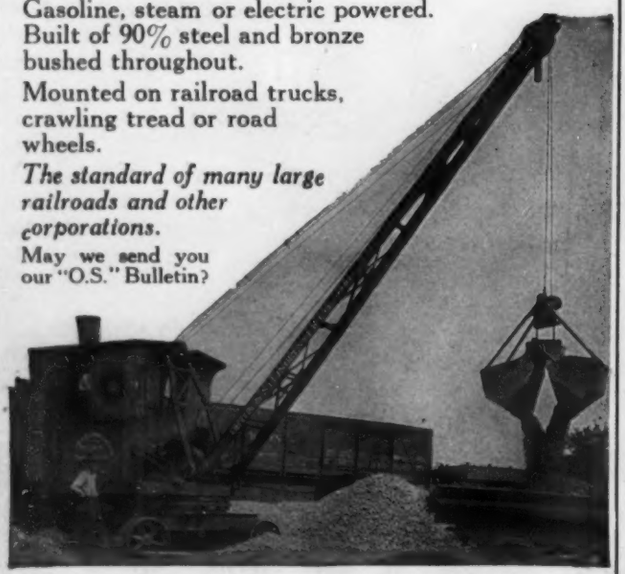
Gasoline, steam or electric powered.
Built of 90% steel and bronze bushed throughout.
Mounted on railroad trucks, crawling tread or road wheels.
The standard of many large railroads and other corporations.
May we send you our "O.S." Bulletin?



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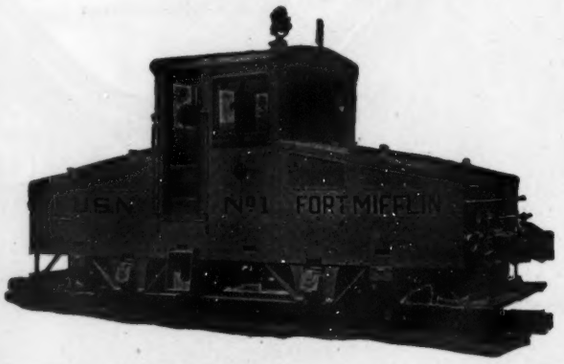

This Atlas Storage Battery Locomotive is used in numerous industrial plants for car switching.

Like all Atlas Industrial Haulage Equipment, this car embodies the most improved electrical equipment and is designed to perform under the most adverse circumstances. This locomotive is built with the requirements in mind, consequently, gives year in and year out service with the minimum of attention.

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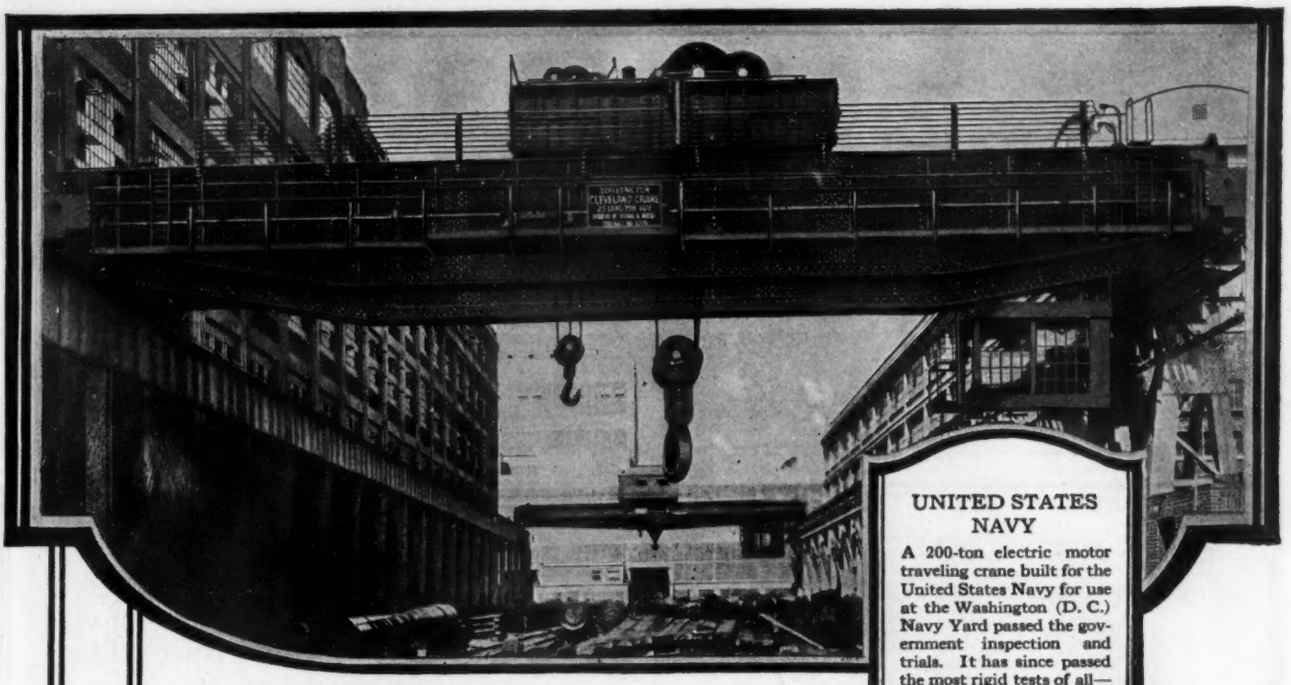

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A 200-ton electric motor traveling crane built for the United States Navy for use at the Washington (D. C.) Navy Yard passed the government inspection and trials. It has since passed the most rigid tests of all—that of continuous service at hard work.

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The right crane for the job—that is the most important objective before our engineers when designing a new Cleveland Crane. And there is no deviation from that rule, whether the crane is built to your specifications or our own.

The same interest in building "the right crane" is shown in every estimate submitted, from the smallest 5-ton shop crane to a 500-ton gantry, built to withstand the most severe service imaginable.

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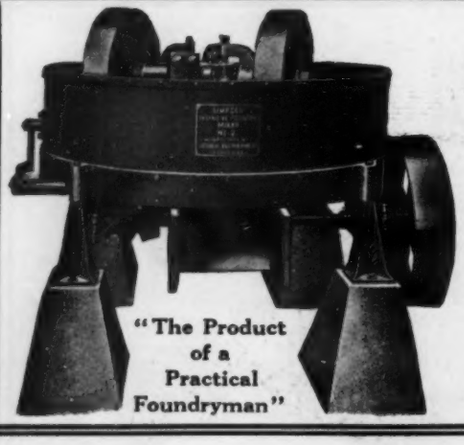

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also for preparation of daubing to line furnaces, ovens, cupolas, etc.

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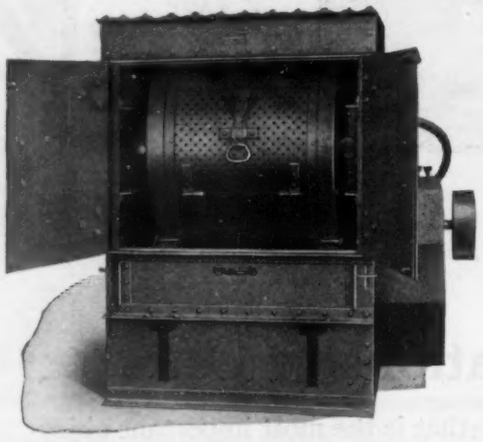

American Sand Blast Barrel, Pressure Type. Simple? Yes, but it's all there. The Pressure Type saves machinery, power, and floor space. Uses sand, shot, or grit, and any desired air pressure.

We build and install all types of sand blast equipment.

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HORIZONTAL CHARGERS

One of the two Morgan 5-Ton, 45' 0" Span Slab Chargers, at The Youngstown Sheet & Tube Company's Indiana Harbor, Ind. Plant.

The design and construction of charging machines is naturally closely allied to the design and manufacture of overhead traveling cranes, a business in which The Morgan Engineering Company is a pioneer. Morgan has, in fact, specialized in the manufacture of this type of machine and the same features of advanced design, ruggedness, safety and accessibility, which have always characterized Morgan Cranes, have played an important part in establishing the enviable reputation of Morgan Charging Machines.

Morgan Horizontal Chargers are made in three main types. Low Type Floor Charger, High Type Floor Charger and Overhead Charger, as illustrated. Each has its particular advantage, as determined by individual plant conditions.

Our engineers will be glad to assist you in securing the equipment best suited to your needs. Send for Bulletin No. 20.

The Morgan Engineering Co.

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Designers, Manufacturers and Contractors
Electric Traveling Cranes, Rolling Mill Machinery
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Manufacturers learn to admire business concerns for what they are and what they do, a great many parts now made on screw machines lend themselves to heading which results in great savings and improved service. Have our specialists consult with you, our service is free and we might suggest something that may prove of considerable importance to you.

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Standard Machine Screws
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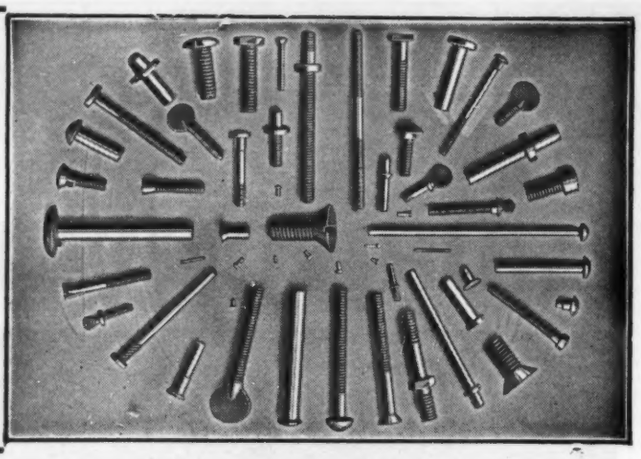
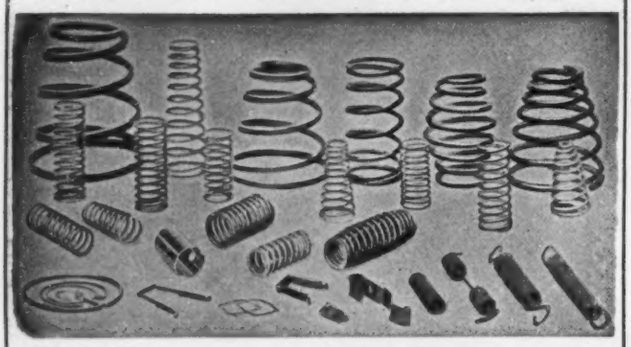
Interchangeable bolts and nuts made strictly to A. S. M. E. tolerances.



SPRINGS



Few realize, even among engineers, how much of engineering design, proper calculation of stresses, metallographic selection of materials, and scientific heat treatment, is involved in the production of a high grade spring—
We realize all these things—
AND DO THEM

THE WM. D. GIBSON CO.
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MANUFACTURERS OF ALL TYPES OF SPRINGS
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Turn your wire specialty and spring problems over to us in your own economy. Our specialties backed by over thirty years of experience.

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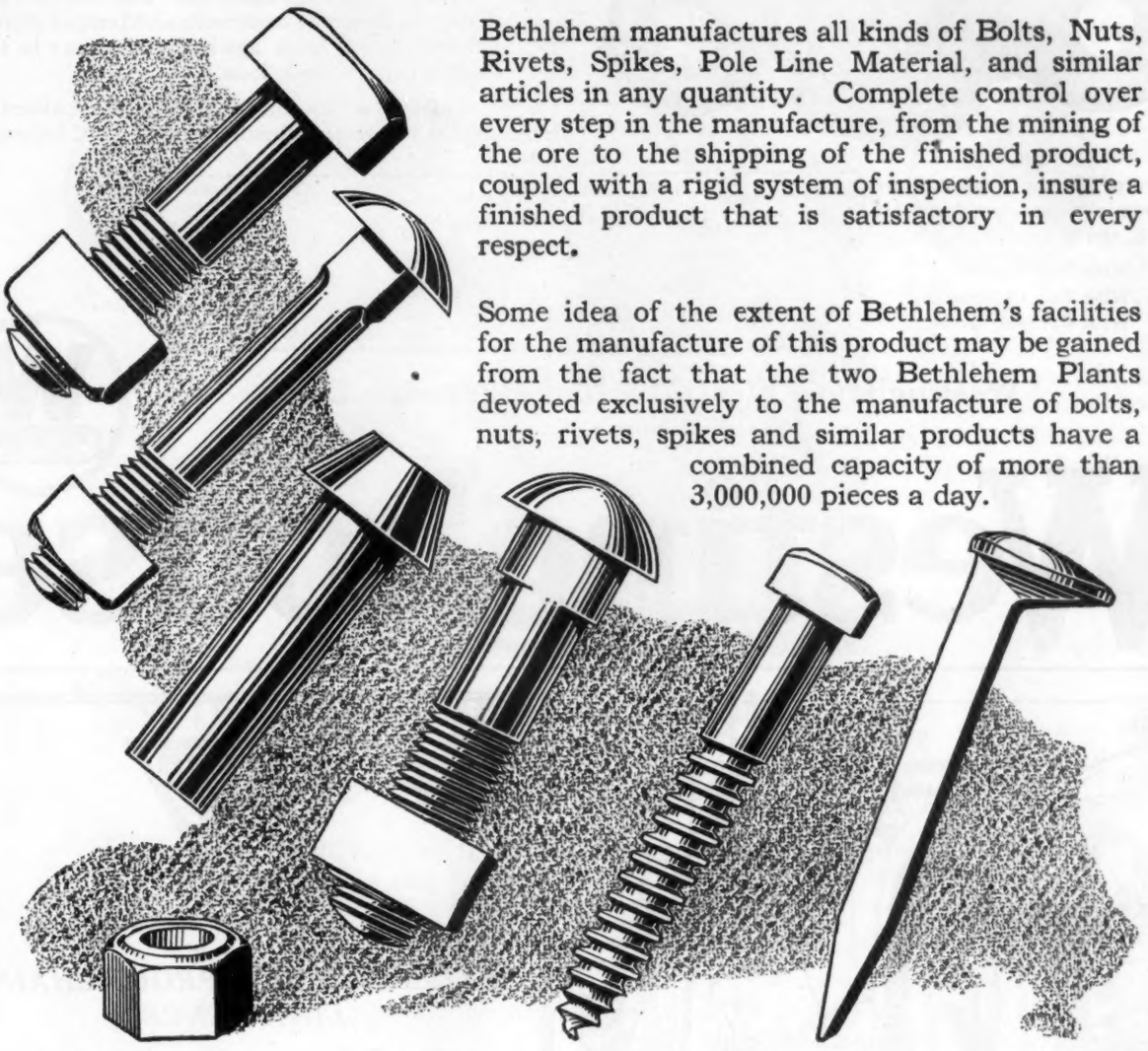

Bethlehem manufactures all kinds of Bolts, Nuts, Rivets, Spikes, Pole Line Material, and similar articles in any quantity. Complete control over every step in the manufacture, from the mining of the ore to the shipping of the finished product, coupled with a rigid system of inspection, insure a finished product that is satisfactory in every respect.

Some idea of the extent of Bethlehem's facilities for the manufacture of this product may be gained from the fact that the two Bethlehem Plants devoted exclusively to the manufacture of bolts, nuts, rivets, spikes and similar products have a combined capacity of more than 3,000,000 pieces a day.

Bolt, Nut and Rivet Catalog on Request

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BETHLEHEM

Westinghouse "Duro" Molded Strain Insulators

"Duro" Molded Strain Insulators are infusible and are unaffected by heat except under extreme temperatures. They will not shrink with age or by exposure to the most severe weather conditions.

"Duro" insulators withstand the electrical test after the mechanical test has been made, as tabulated below:

"Duro" Strain Insulators are made in two sizes—2 and 2½ inch, and in three styles:

With Two Eyes
With Two Clevises
With Eye and Clevis

Style Number	Test Voltage before Mechanical Test	Mechanical Test	Test Voltage after Mechanical Test
2" Style, 311909	10,000	4000	10,000
2½" Style, 324058	10,000	6000	10,000
2" Style, 324060	10,000	4000	10,000
2½" Style, 324057	10,000	6000	10,000
2" Style, 311911	10,000	4000	10,000
2½" Style, 324059	10,000	6000	10,000

Westinghouse Electric & Manufacturing Co.
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Raymond WIRE Springs

Our 40 years' experience in solving spring problems is your assurance of a highly efficient, dependable and longlived service. Our Engineering Dept. will be pleased to consult with you at any time.

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We specialize "Anything in Mechanical Springs."

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Hot Galvanized After Weaving

Recognized as the standard woven wire fence for enclosing industrial plants. The construction of chain link fabric makes it without doubt the strongest woven wire fencing manufactured. The original Wickwire Spencer process of hot galvanizing after weaving gives the entire finished product a heavy coating of pure spelter and insures a length of life that cannot be obtained in any other way.

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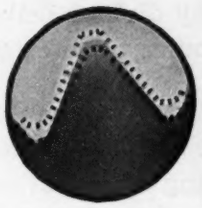
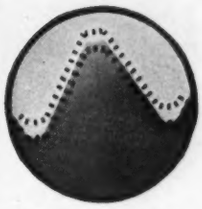
EMPIRE BOLTS & NUTS



Comparator photograph, hardened and ground gauge thread.



Comparator photograph, New Process bolt thread.

"Now, can you tell me which is the more accurate?"

"I'LL confess *I* can't, either by running them through a ring gauge or studying their comparator shadows."

And the reason he can't is because there *isn't any difference*—any difference that you can measure by any known method.

This is the first and only instance of a quantity production bolt having a thread accuracy comparable to a hardened and ground gauge. Empire *New Process* bolts, with their built-up threads, are six times more accurate than the finest cut-thread bolts. Because of their molecular structure not being disturbed in the production of the threads, they are many times stronger. Stripping or fracturing, except by deliberate intent, is practically impossible.

Empire *New Process* bolts are fit and proper mates for Empire cold punched nuts. They are *made* for each other—produced to the same standards of accuracy and durability, in the plant where cold punching and cold heading originated.

Use them together, and one of your most irritating [and expensive] assemble problems will be solved.

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First: The load can be automatically divided between the turbine and motor, depending upon exhaust steam requirements.

Second: Breakdown insurance. In the event of failure of turbine or motor the remaining drive will carry the load without interruption of service.

Third: There is undivided responsibility for the component parts of the unit—the turbine, generator, and motor are all Westinghouse products.

Westinghouse engineers are always ready to assist in the selection of equipment for dependable exciter service.

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Sales Offices in All Principal Cities of
the United States and Foreign Countries

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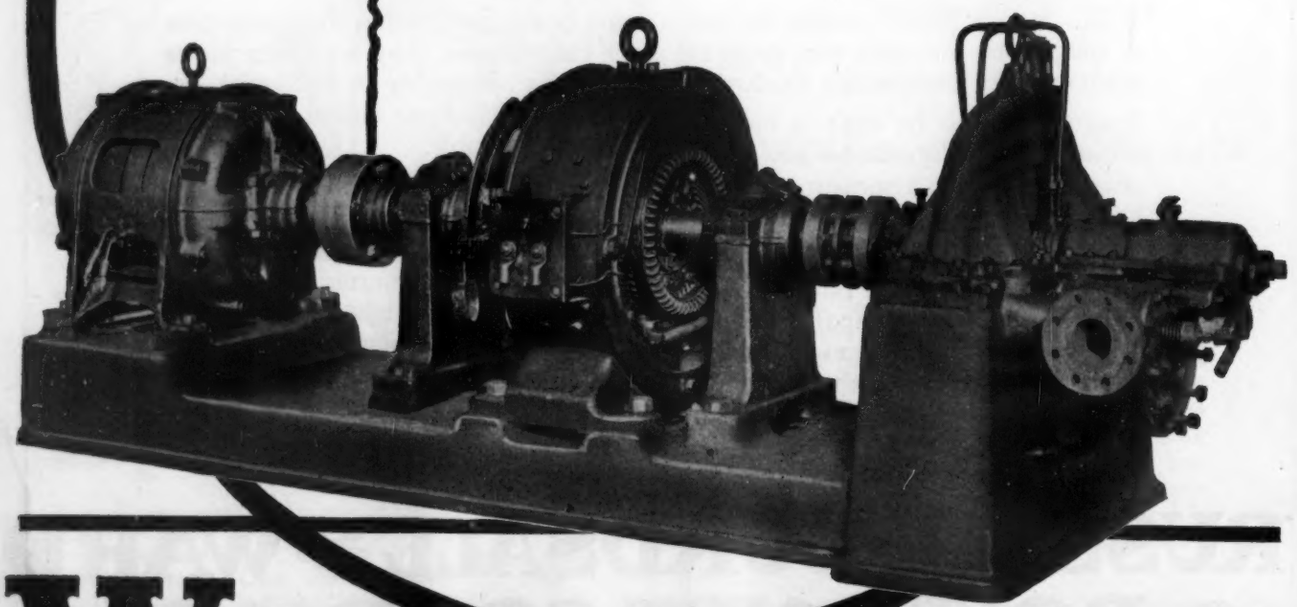

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LEWIS

REDUCTION GEAR DRIVES

POWER must be **DELIVERED** to the Mill **EFFICIENTLY.**

The success of any machine depends upon the power delivered.

Lewis gear units are designed and built to operate at a minimum loss.

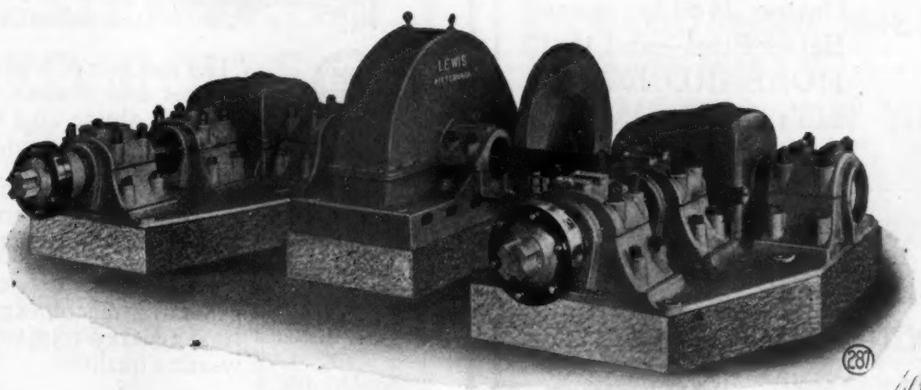
The gear drive shown below was built to deliver power from the motor to a Tandem Mill.

Unit base construction eliminates vibration.

Cut tooth cast steel gears reduce noise.

Completely enclosed gears eliminates grit and minimizes wear.

In all Lewis gear drives, **POWER** will be **DELIVERED** to the mills **EFFICIENTLY.**



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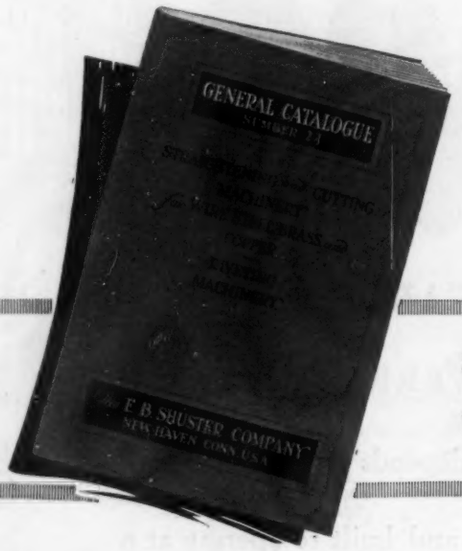
Pittsburgh, Pa., U. S. A.

"If it's SHUSTER Built,— it's Built Right"

Many years of experience with Shuster Straightening and Cutting Machinery, have convinced users that the name "Shuster" on this class of equipment is a sure sign of unusual durability, precision, speed and economy.

Besides belt driven machines, we now build a full line of *Self Contained Direct Motor Driven Straighteners and Cutters.* Keeping strictly up to the minute in design and construction has always been a hobby with us—and our product shows it.

Ask us to send you our catalog and Bulletins. They will give you a comprehensive idea of the super-efficiency of Shuster products.



Write for this—

The F. B. Shuster Co.
Formerly John Adt & Son
NEW HAVEN, CONN.
Established 1866

We Specialize in Building of
STRAIGHTENING and CUTTING MACHINERY
for All Sizes and Shapes of
WIRE, STEEL, BRASS and COPPER
We also build RIVETING MACHINERY

Rolling Mill Jim Says—
Say Fellas:
Don't forget that Better Rolls mean Better Steel—and that HUBBARD ROLLS can't be beat.
S'Long
Rolling Mill Jim—
Hubbard Steel Foundry Co.
EAST CHICAGO, IND.
All Kinds of Iron and Steel Rolls and Steel Castings
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HF

"Yes Sir, there is more to a gear than—"
"Just a piece of iron or steel with teeth cut in it.
"The real test of a gear is the service it gives and it can't stand up under shocks, abuse and incessant wear unless it's made right."
Foote IXL Gears are designed and produced by an organization with 30 years of specialized experience behind it.
They are accurately cut with modern generating machines and scientifically heat treated to give maximum wearing qualities.
Foote Heat-Treated Gears last 4 times as long as untreated gears.
We Manufacture
Cut Gears of All Kinds
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Micarta Timing Gears
Flexible Couplings
Gear Racks
Speed Reducers
Special Machinery
Send for 400 page hand book "Gear Problems"
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Please send without obligation a copy of the Foote IXL Gear Book
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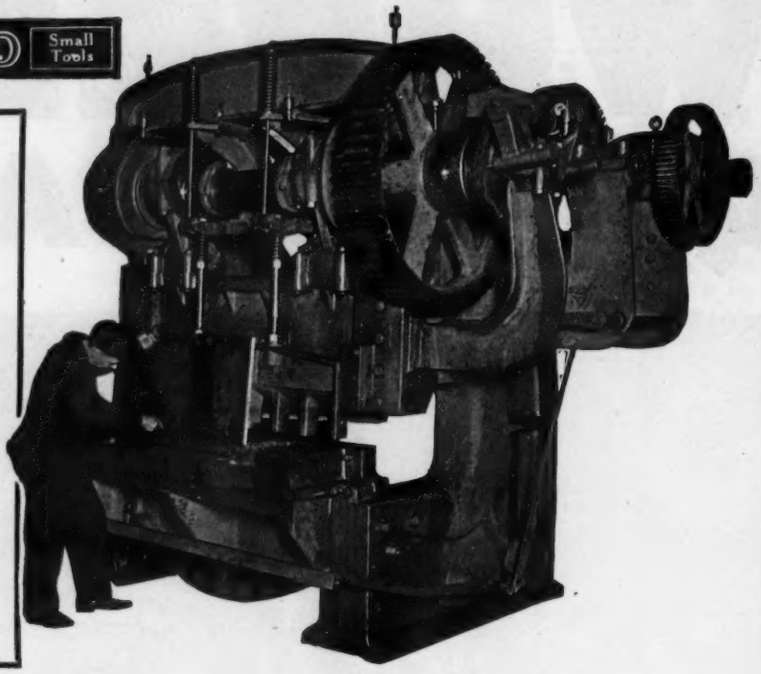
Machine Tools SOLID STEEL Small Tools

How's This For Accuracy?

A 1" plate sheared by this machine was placed on edge on a true surface and was found to be so accurately sheared that it was impossible to get a .010 feeler gauge underneath it *anywhere*.

Such accuracy demands absolute rigidity of construction even under the heaviest cuts. And this has always been a feature of Cleveland machines.

Ask us about the construction features of this rigid, rugged, accurate Gate Shear.



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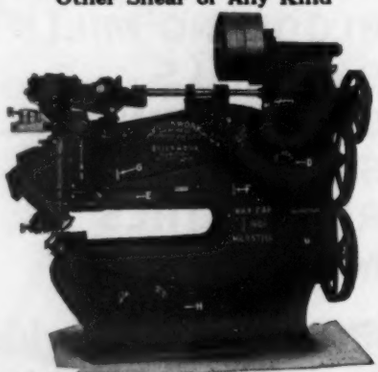
MADE IN VARIOUS SIZES AND STYLES

For cutting all gauges of sheet and plate up to 1 inch thick used in building Ships, Boilers, Cars, Tanks and General Plate and Sheet Metal Work. Cut square or beveled edges in straight or irregular shapes, also cut rings and discs, and cut openings without starting in from side of sheet. Leaves the metal flatter than any other Rotary or Short Straight-Bladed Shear. Cuts a clean edge that requires no finishing.

Joggling and flanging rolls can be used interchangeably with the cutters.

Do Long Straight Cutting Faster Than Any Other Shear of Any Kind



Patented June 3, 1913; Aug. 26, 1919; Mar. 29, 1921. Other patents pending

One "QUICKWORK" does the work of a number of old style machines. Does it better and from two to ten times quicker.

Eliminate Oxy-Acetylene Cutting and Plate Planing.

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Cable Address: "QUICKWORK". All standard codes used.
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The possibilities of *Bradley Hammers* are almost unlimited. By the application of dies they produce tougher parts than can be made by other methods — and at a great saving in material, time and labor.

Bradley Hammers combine strength, power, speed and economy. They are easy to operate and control. *Bradley Hammers* are made in 4 styles and 32 sizes—a style and size to solve every forging problem.

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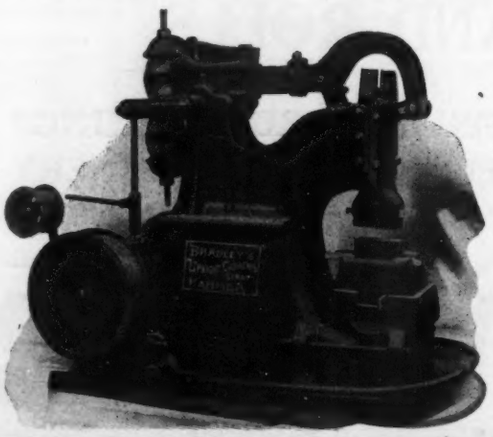

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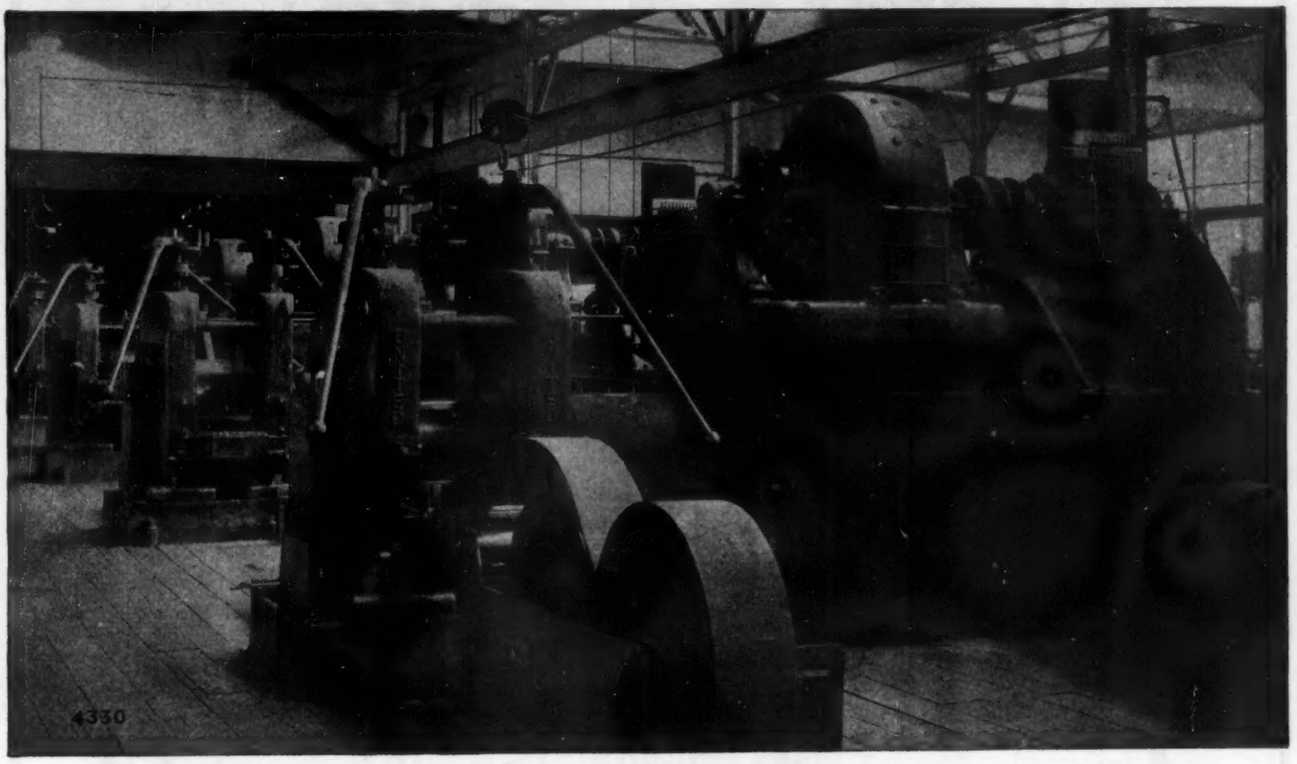
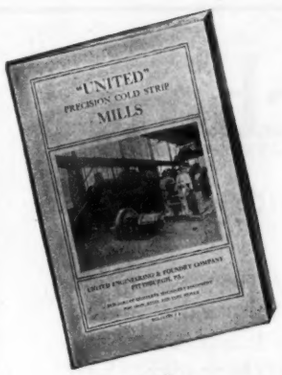


16" x 22" Precision Cold Strip Mills

PROMINENT USERS OF "UNITED" COLD STRIP MILLS



UNITED ENGINEERING
& FOUNDRY COMPANY
PITTSBURGH
PENNA

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"UNITED" Strip Mills for the rolling of steel and the softer metals are leaders in their line, a position also held by our Plate, Sheet, Tube, Blooming and Merchant Mills. This fact is evidenced by the increasing number of prominent manufacturers installing these mills. 74 cold strip mills have been furnished to the following:

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3—10" x 12"—Blair Strip Steel Co., New Castle, Pa.
8—12" x 16"—Weirton Steel Co., Strip Steel Dept., Weirton, W. Va.
2—12" x 12"—Weirton Steel Co., Strip Steel Dept., Weirton, W. Va.
5—12" x 16"—Morris & Bailey Div., Oliver Iron & Steel Co., Wilson, Pa
2—12" x 16"—Thomas Steel Products Co., Warren, Ohio
1—12" x 20"—Matthiessen & Hegeler Zinc Co., La Salle, Ill.
1—16" x 28"—Morris & Bailey Div., Oliver Iron & Steel Co.
4—16" x 20"—Morris & Bailey Div., Oliver Iron & Steel Co.
5—16" x 22"—Columbia Steel Co., Elyria, Ohio
4—16" x 20"—Greer Steel Co., Dover, Ohio
4—16" x 20"—Superior Steel Corporation, Carnegie, Pa.
4—16" x 20"—Weirton Steel Co., Weirton, W. Va.
4—16" x 26"—Illinois Zinc Co., Peru, Ill.
4—16" x 22"—Griffin Mfg. Co., Erie, Pa.
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1—20" x 24"—Superior Steel Corp., Carnegie, Pa.
1—20" x 24"—Central Steel Co., Massillon, Ohio
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COMPLETE ROLLING MILL EQUIPMENT

UNITED

LARGEST ROLL MAKERS IN THE WORLD

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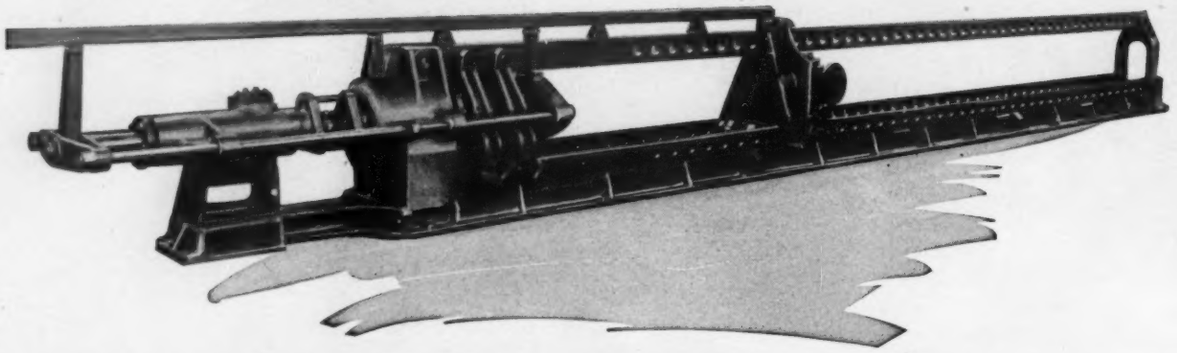
Motor Driven Carriage



We design and build machines of the better class, for the manufacture of wrought iron or steel pipe. Accuracy, easy operation and long service are their cardinal features. Ask the users. We shall be glad to figure on your requirements.

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Men and MATERIALS are judged by what they prove to be—over a long period of time. They are measured by the SERVICE rendered. CLAIMS do not count—PERFORMANCE is the only Standard for winning the confidence of Competent Judges. THE BEST MEN in THE BEST MILLS are among THE BEST JUDGES of MEN and MATERIALS.

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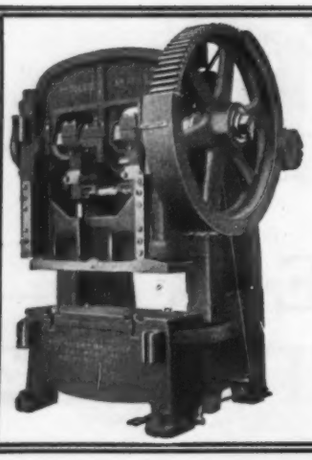

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DOUBLE CRANK PRESSES OF KNOWN RELIABILITY

Over 250 sizes with adaptability covering practically every requirement of general sheet metal and drop forged work. They are conspicuous for sturdy, well balanced construction, long life and accurate, economical performance.

"PRESSES FOR EVERY PURPOSE"

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Repeat Orders By Thousands Tell the Whole Story

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Because they have found the Johnson clutch the most dependable and economical clutch service. Note its simplicity. Perfectly smooth; no projections. Efficient, durable and powerful. Write us today about your clutch problems; our engineers will solve them.

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AMS Gang Slitter

For All Light Sheet Metals

High Speed—Labor Saving. Will trim or slit sheets Dead True. Automatic or hand feed. Double edged cutters give double service and can be ground without removing from machine. AMS Quick Adjustable Hub Clamp and many other exclusive features make it the most satisfactory machine of its kind.

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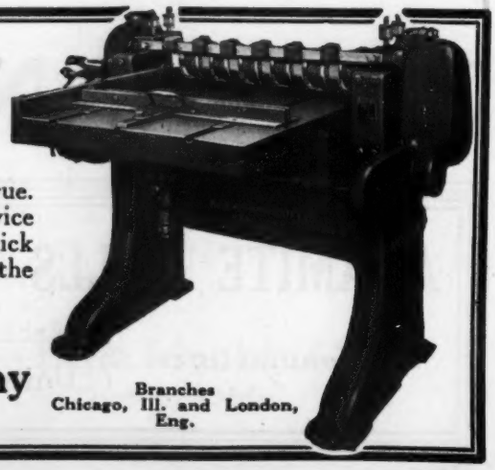
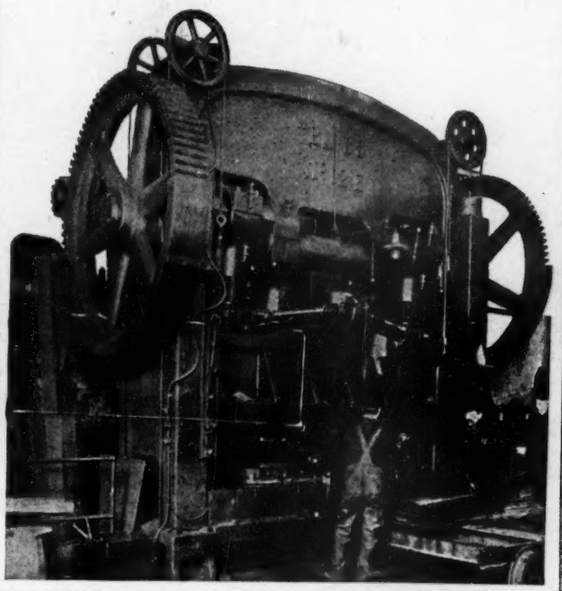


Branches Chicago, Ill. and London, Eng.

In Making Large Sheet Metal Parts —
Bliss Presses solve many difficult problems



TAKE CAR BUILDING for example. The modern steel car must be strongly designed, well built, economically manufactured and, moreover, pleasing in appearance. These various requirements present a difficult problem, but pressed steel parts formed by BLISS Presses provide a satisfactory solution.

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BLISS

No. 363

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Automobile Parts
Bicycle Parts
Bird Cages
Bottle Caps
Brass Goods
Brittania Ware
Buckles
Burners
Butter Tins
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Cigarette Boxes
Clocks
Coal Hods
Collapsible Tubes
Cooking Utensils
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Cuspidors
Cutlery
Dental Instruments
Dinner Pails
Drip Pans
Door Knobs
Drop Forgings
Druggists' Tinware
Dust Pans
Electrical Goods
Elevator Buckets
Enamel Ware
Expanded Metal Lath
Fish Cans
Forks
Fruit Cans
Fry Pans
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Gas Ranges
Gun Parts
Hammers
Hardware
Harness Trimmings
Hinges
Horse Shoes
Jewelry
Kitchen Boilers
Kitchen Utensils
Lamps
Lanterns
Lard Pails
Locks
Match Boxes
Meat Cans
Medals
Metallic Ceilings
Metal Lath
Metal Radiators
Musical Instruments
Oil Cans
Oil Stoves
Perforated Metal
Paint Cans
Paint Tubes
Petroleum Cans
Pick-eyes
Pieced Tinware
Plated Ware
Playing Cards (Cutting)
Powder Kegs
Range Boilers
Range Parts
Reflectors
Refrigerators
Roofing
Satchel Frames
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Shingles (Metal)
Shovels
Spoons
Sheet Steel Stoves
Steel Barrels
Stove Trimmings
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BLISS

Since 1857

How About the Steel?

WHEN a manufacturer is striving to meet production schedules, he must be able to depend upon his sources of supply. Deliveries of steel—when he needs them—are essential.

For over 80 years, manufacturers have been able to depend upon Ryerson under all conditions.

Immediate shipment of everything in steel—from a bolt to an I-beam, a single item or several carloads—that is the function of Ryerson Steel-Service.

The Ryerson Journal and Stock List is the "key" to Immediate Steel—write for your copy!

JOSEPH T. RYERSON & SON INC.
ESTABLISHED 1842

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MILWAUKEE MINNEAPOLIS NEWARK SAN FRANCISCO TULSA

RYERSON STEEL-SERVICE

Sivyer Castings can be forged and welded

An assembly of elevator parts cast in Sivyer Electric Steel

SIVYER (S) CASTINGS
DEPENDABLE

Sivyer Electric Steel to Solve Your Castings Problems

Perhaps, you are having trouble with forged parts—parts that do not give the service that you think they should—or, perhaps, your costs on forgings are running rather high. Parts of intricate or thin section design can be readily and economically cast in steel. Sivyer Electric Steel Castings are exceptionally durable and show great resistance to wear and strains. The high temperature electric furnaces, plus the excellent Sivyer annealing practice—where the castings are grouped for annealing according to the heat treatment that they require—provide a tough close-grained metal that furnishes exceptional strength and resistance to wear even under the most exacting conditions.

Send Blue Prints

If you will send us blue prints of the parts giving trouble with a statement of your difficulties we will be glad to recommend possible solutions without obligation on your part.

Defeating the Steady Pull of 60,000 Pounds

THE elevator assembly, pictured above, is called upon to support a dead weight of about 60,000 pounds. When the drill pipe, supported between the elevators, becomes jammed this strain is often doubled and even trebled. It is evident that the elevator must be exceptionally strong. To forge the parts would be expensive and in some cases impractical, because of their design. In addition, the use of Sivyer Electric Steel Castings enables the manufacturer to produce this assembly with a minimum of machine work.

SIVYER STEEL

SIVYER STEEL CASTING COMPANY, MILWAUKEE

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Prest-O-Lite Co., Inc., The, Indianapolis, Ind.

ACETYLENE GENERATORS
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Oxweld Acetylene Co., Newark, N. J.

ACETYLENE IN CYLINDERS
Air Reduction Sales Co., 342 Madison Ave., New York City.
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American Adamite Co., The, 311 Oliver Bldg., Pittsburgh, Pa.

AGITATORS
Chapman Engineering Co., Mt. Vernon, O.
Cooper C. & G., Co., Mt. Vernon, Ohio.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
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Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, New York.

ALUMINUM
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Rogers, Brown & Co., Room 1942, 30 Church St., New York.

ALUMINUM (Vanadium)
Vanadium Corp. of America, 120 Broadway, New York.

ALUMINUM TUBING
Summerill Tubing Co., Bridgeport, Pa.

ANGLES, TEES, CHANNELS—See STEEL (Structural)

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Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Riter-Conley Co., Oliver Bldg., Pittsburgh, Pa.
Smith, George H., Steel Casting Co., Milwaukee, Wis.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wilfong, Millard F., Iron Works Co., 5195 Grays Ave., Philadelphia, Pa.
Zanesville Malleable Co., Zanesville, Ohio.

APPRAISALS
McKee, Arthur G., & Co., 2432 Euclid Ave., Cleveland, O.

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Laclede-Christy Clay Products Co., St. Louis, Mo.

ARCHITECTS (Industrial)
Ferguson, H. K., Co., The, 6523 Euclid Ave., Cleveland, Ohio.

ARMOR FOR CONCRETE FLOORS
Irving Iron Works, Long Island City, N. Y.

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Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.
Ladish Drop Forge Co., Cudahy, Wis.
Lockport Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pollak Steel Co., Cincinnati, O.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

BALING PRESSES
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BANDS AND HOOPS (Galvanized Strips)
Sharon Steel Hoop Co., Sharon, Pa.

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Larkin, J. K., & Co., Inc., 253 Broadway, New York City.
Lockhart Iron & Steel Co., Pittsburgh, Pa.

BANDS (Steel)
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Pollak Steel Co., The, Cincinnati, Ohio.
Walsh & McGee Steel Co., 2 Rector St., New York City.

BANDS (Welded Iron and Steel)
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BAR BENDERS
Kardong Bros., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., 71 Broadway, New York City.

BARRELS (Steel)
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Central Steel Co., Massillon, Ohio.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Harrisburg Pipe and Pipe Bending Co., Harrisburg, Pa.

BARS (Concrete Reinforcements)
Bethlehem Steel Co., Bethlehem, Pa.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Pacific Coast Steel Co., San Francisco, Cal.
Pollak Steel Co., The, Cincinnati, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
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Walsh & McGee Steel Co., 2 Rector St., New York City.

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Brown-Wales Co., 493 C St., Boston, Mass.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., The, Milton, Pa.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Penn Iron & Steel Co., Creighton, Pa.

BARS (Iron and Steel)
Truscon Steel Co., Youngstown, Ohio.

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Central Steel Co., Massillon, O.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Warehouse Co., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Milton Mfg. Co., The, Milton, Pa.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Pacific Coast Steel Co., San Francisco, Cal.
Pollak Steel Co., The, Cincinnati, O.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., 1351 Brown-Marx Bldg., Birmingham, Ala.
Walsh & McGee Steel Co., 2 Rector St., New York City.
Youngstown Sheet & Tube Co., Youngstown, O.

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Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.
Inland Steel Co., First National Bank Bldg., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Pacific Coast Steel Co., San Francisco, Cal.
Phoenix Iron Co., The, 20 So. 15th St., Philadelphia, Pa.
Pollak Steel Co., The, Cincinnati, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Snead Architectural Iron Works, Louisville, Ky.
Walsh & McGee Steel Co., 2 Rector St., New York City.

BEARINGS AND BUSHINGS (Bronze)
Wellman Bronze Co., The, 6017 Superior Ave., Cleveland, O.

BEARINGS (Ball)
New Departure Mfg. Co., The, Bristol, Conn.
Norma-Hoffman Bearings Corp., Anable Ave., Long Island City, N. Y.
Strom Ball Bearing Mfg. Co., 4535 Palmer St., Chicago, Ill.

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Keystone Bronze Co., 39th St., Pittsburgh, Pa.

BEARINGS (Motor)
Norma-Hoffman Bearings Corp., Anable Ave., Long Island City, N. Y.

BEARINGS (Roller)
Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffman Bearings Corp., Anable Ave., Long Island City, N. Y.

BEARINGS (Thrust)
Norma-Hoffman Bearings Corp., Anable Ave., Long Island City, N. Y.

BELT LACING (Leather)
Chicago Rawhide Mfg. Co., 1305 Elston Ave., Chicago, Ill.

BELTING (Chain)
Link-Belt Co., 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

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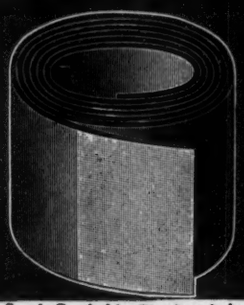

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Treated with PURE Creosote Oil — one reason why they are practically everlasting. Ask us to show you *all* their economic advantages.

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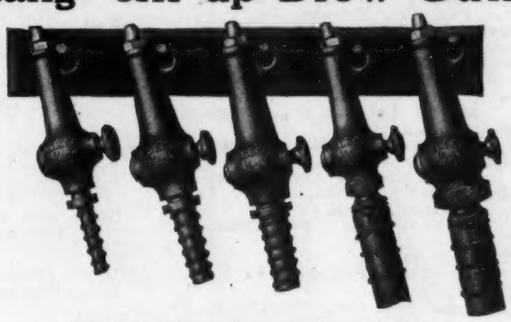
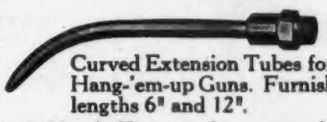


Protects them from grit and dirt.
Made in Sizes, ¼", ⅜", ½" Pipe Thread or Hose Stem Inlets—⅛" Diameter-Outlets



Curved Extension Tubes for Use with Hang-'em-up Guns. Furnished in two lengths 6" and 12".

The standard Nozzle-Tip can be removed and the Curved-Extension used to reach into any Pocket or Corner that cannot be reached with the Standard Gun.

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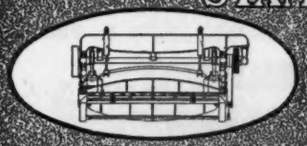

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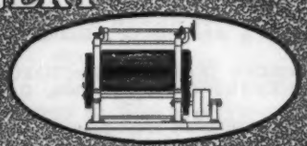

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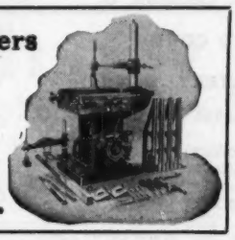

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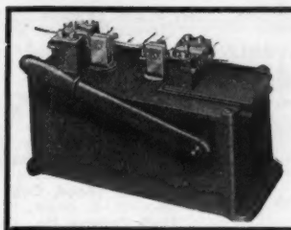

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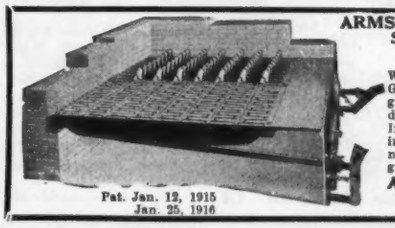

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Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

FERROMANGANESE
Agnew, Batteiger & Co., 1630-32 Widener Bldg., Philadelphia, Pa.
Crocker Bros., 21 E. 40th St., New York City.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Leavitt, C. W., & Co., 30 Church St., New York City.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Crocker Brothers, 21 E. 40th St., New York City.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Globe Iron Co., Jackson, O.
Keokuk Electro Metals Co., Keokuk, Iowa.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

FERROVANADIUM
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 120 Broadway, New York

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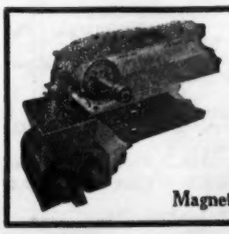
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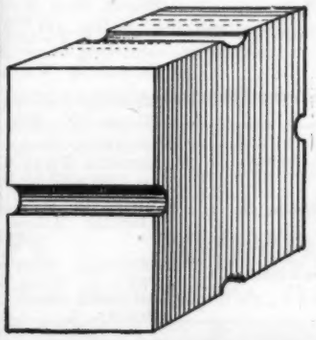
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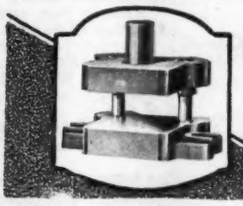
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Ashland Fire Brick Co., Ashland, Ky.
Brighton Fire Brick Co., Block House Run, New Brighton, Pa.
Clearfield Brick Mfg. Co., Clearfield Trust Bldg., Clearfield, Pa.
Crescent Refractories Co., Curwensville, Clearfield Co., Pa.
Dover Fire Brick Co., Cuyahoga Bldg., Cleveland, O.
General Refractories Co., 117 S. 16th St., Philadelphia, Pa.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.
Haws Refractories Co., Johnstown, Pa.
Ironton Fire Brick Co., The, Ironton, O.
Kier Fire Brick Co., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Portsmouth Refractories Co., Portsmouth, O.
Pyro Clay Products Co., The, Oak Hill, O.
Queen's Run Refractories Co., Inc., Lock Haven, Pa.
Stowe-Fuller Refractories Co., The, 1650 Union Trust Bldg., Cleveland, O.
Superior Basic Brick Co., 517 Bessemer Bldg., Pittsburgh, Pa.
Union Mining Co., Mt. Savage, Md.
United States Refractories Corp., Mt. Vernon, Pa.

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Kinnear Mfg. Co., The, 818-868 Field Ave., Columbus, O.

FIRST AID PREPARATIONS
C. N. G. Laboratories Co., 439 Fort St., Detroit, Mich.

FIXTURES (Lighting)
Thompson Electric Co., 226 St. Clair Ave., Cleveland, O.

FLANGES (Pipe)
Dart, E. M., Mfg. Co., Providence, R. I.

FLANGES (Pipe Forged Steel)
Cann & Saul Steel Co., 516 Commerce St., Philadelphia, Pa.

FLANGING MACHINES
Dries & Krump Mfg. Co., 7408 Loomis St., Chicago, Ill.
Quickwork Co., The, St. Mary's, Ohio.

FLASKS
Truscon Steel Co., Youngstown, Ohio.

FLASKS (Snap)
American Foundry Equipment Co., 366 Madison Ave., New York City.
Diamond Clamp & Flask Co., Richmond, Ind.

FLOORING (Fireproof, Metallic, Nonslipping, Ventilating)
Irving Iron Works, Long Island City, N. Y.

FLOORING (Steel, Ventilating, Nonslipping, Fireproof)
Irving Iron Works, Long Island City, N. Y.

FLOORING (Wood Block Creosoted)
Republic Creosoting Co., Merchants Bank Bldg., Indianapolis, Ind.

FLOOR PLATES (Rolled Steel)
American Pressed Steel Co., Commercial Trust Bldg., Philadelphia, Pa.

FLUOR SPAR
Hillside Fluor Spar Mines, First National Bank Bldg., Chicago, Ill.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Rogers, Brown & Co., Cincinnati, O.

FLUX (Welding)
Chemical Treatment Co., 81 New St., New York City
Oxweld Acetylene Co., Newark, N. J.

FORGES
Bradley, C. C., & Sons, Inc., 432 N. Franklin St., Syracuse, N. Y.

FORGING BILLETS
Andrews Steel Co., Newport, Ky.
Central Steel Co., Massillon, O.
Wheeling Steel Corp., Wheeling, W. Va.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.

FORGING BILLETS (Alloy and Carbon Steel)
Central Steel Co., Massillon, O.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

FORGING FURNACES
Chapman-Stein Furnace Co., Mt. Vernon, Ohio.

FORGING MACHINERY
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y
Bradley, C. C. & Son, Inc., 432 N. Franklin St., Syracuse, N. Y.
Mackintosh-Hemphill Co., Pittsburgh, Pa.

FORGING (Brass)
Chicago Forging & Mfg. Co., 2004 Southport Ave., Chicago, Ill.

FORGING (Bronze and Copper)
Chicago Forging & Mfg. Co., 2004 Southport Ave., Chicago, Ill.

FORGINGS (Drop)
Bay City Forge Co., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Forge & Axle Co., 2003-35 Deuber Ave., Canton, Ohio.
Columbus Forge & Iron Co., Columbus, O.
Drop Forging Co. of New York, Jersey City, N. J.
Eccles, Richard, Co., Auburn, N. Y.
Heppenstall Forge & Knife Co., Arsenal Station, Pittsburgh, Pa.
Ladish Drop Forge Co., Cudahy, Wis.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Philadelphia Steel & Iron Co., Commercial Trust Bldg., Philadelphia, Pa.
Pittsburgh Knife & Forge Co., Pittsburgh, Pa.
Pollak Steel Co., The, Cincinnati, O.
Queen City Forging Co., The, 235 Tennyson St., Cincinnati, Ohio.
Rockford Drop Forge Co., Rockford, Ill.
Scranton Forging Co., Scranton, Pa.
Storms Drop Forging Co., Page Blvd., Springfield, Mass.
Strieby & Foote Co., 301 Ogden St., Newark, N. J.
Transue & Williams Steel Forging Corp., Alliance, O.
Wheeling Axle Co., The, Wheeling, W. Va.
Wilcox, D., Mfg. Co., Mechanicsburg, Pa.

FORGINGS (Drop Upset)
American Forge Co., 2620 S. Hoyne St., Chicago, Ill.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1055 West 19th St., Erie, Pa.

FORGINGS (Iron and Steel)
Bay City Forge Co., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bradley, C. C., & Son, Inc., 432 N. Franklin St., Syracuse, N. Y.
Cann & Saul Steel Co., 516 Commerce St., Philadelphia, Pa.
Canton Forge & Axle Co., 2003-35 Deuber Ave., Canton, Ohio.
Columbus Forge & Iron Co., Columbus, O.
Eccles, Richard, Co., Auburn, N. Y.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Ladish Drop Forge Co., Cudahy, Wis.
Leard, Wm., Co., The, New Brighton, Pa.
McMyler-Interstate Co., Bedford, O.
Midvale Co., The, 4320 Wissahickon Ave., Philadelphia, Pa
Philadelphia Steel & Iron Co., Commercial Trust Bldg., Philadelphia, Pa.
Pollak Steel Co., The, Cincinnati, O.
Rockford Drop Forge Co., Rockford, Ill.
Storms Drop Forging Co., Page Blvd., Springfield, Mass.
Titusville Forge Co., Titusville, Pa.
Transue & Williams Steel Forging Corp., Alliance, O.
Vanadium Corp. of America, 120 Broadway, New York City.
Wilcox, D., Mfg. Co., Mechanicsburg, Pa.

FORMS (Steel for Concrete Construction)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

FOUNDRY EQUIPMENT & SUPPLIES
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Chemical Treatment Co., 81 New St., New York City.
National Engineering Co., 549 W. Washington Blvd., Chicago, Ill.
Whiting Corporation, Harvey, Ill.

FOUNDRY SHOVELS
Wood Shovel & Tool Co., Piqua, Ohio.

FRAMES (Wire Drawing)
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., The, Cuyahoga Falls, O.

FROGS AND SWITCHES
Bethlehem Steel Co., Bethlehem, Pa.

FUEL OIL BURNING SYSTEMS AND PLANTS
Fuller Engineering Co., Fullerton, Pa.
Hagan, George J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.

FURNACE APPLIANCES (Water Cooled)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa

FURNACE INSULATION
Armstrong Cork & Insulation Co., 24th Street, Pittsburgh, Pa.
Celite Products Co., 53 W. Jackson Blvd., Chicago, Ill.

FURNACE SYSTEMS (Open Hearth)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

FURNACES (Annealing, Case Hardening and Heat Treating)
Chapman-Stein Furnace Co., Mt. Vernon, Ohio.
Combustion Engineering Corp., 43 Broad St., New York City.
Electric Furnace Co., The, Salem, O.
Hagan, George J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Tate, Jones & Co., Inc., 914 Empire Bldg., Pittsburgh, Pa.

FURNACES (Blast)
Brassert, H. A., Inc., 310 So. Michigan Ave., Chicago, Ill.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Mt. Vernon Bridge Co., Mt. Vernon, Ohio.
Pennsylvania Engrg. Wks., New Castle, Pa.
Riter-Conley Co., Oliver Bldg., Pittsburgh, Pa.

FURNACES (Electric for Nonferrous Metals)
Electric Furnace Co., The, Salem, O.

FURNACES (Electric Melting)
American Bridge Co., 71 Broadway, New York City.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, George J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Pittsburgh Electric Furnace Co., Union Bank Bldg., Pittsburgh, Pa.
Swindell, Wm., & Bros., P. O. Box 1753, Pittsburgh, Pa.

FURNACES (Open-Hearth)
Chapman-Stein Furnace Co., Mt. Vernon, Ohio.
Laughlin, Alex., & Co., First National Bank Bldg., Pittsburgh, Pa.
Smythe, S. R., Co., Pittsburgh, Pa.

FURNACES (Recuperative)
Combustion Engineering Corp., 43 Broad St., New York City.
Electric Furnace Co., The, Salem, O.

GALVANIZING & TINNING CO
Cattie, Joseph P., & Brothers, Gaul and Letterly Sts., Philadelphia, Pa.

GALVANIZING (Hot)
Cattie, Joseph P., & Brothers, Gaul and Letterly Sts., Philadelphia, Pa.

GALVANIZING KETTLES AND POTS
National Wrought Iron Annealing Box Co., Washington, Pa.
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GALVANIZING PLANTS
Wilfong, Millard F., Iron Works Co., 5195 Grays Ave., Philadelphia, Pa.

GALVANIZING PLANTS (For Sheets)
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United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.

GANG SLITTERS
Ams, Max, Machine Co., The, 101 Park Ave., New York City.

GAS BOOSTERS (Rotary Positive Pressure)
Connersville Blower Co., The, Connersville, Ind.

GAS EXHAUSTERS
Chemical Engineering & Foundry Co., Atlanta, Ga.
Connersville Blower Co., The, Connersville, Ind.
Roots, P. H. & F. M., Co., Connersville, Ind.

GAS METERS—See METERS (Gas, Air)

GAS PRODUCER PLANTS
Chapman Engineering Co., Mt. Vernon, O.
Cooper, C. & G., Co., Mt. Vernon, O.
Duff Patents Co., Inc., 321 Union Trust Bldg., Pittsburgh, Pa.
Flinn & Dreffein Co., 435 S. Dearborn St., Chicago, Ill.
Hagan, George J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Koppers Co., The, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Wellman-Seaver-Morgan Co., 7025 Central Ave., Cleveland, O.
Wood, R. D., & Co., 400 Chestnut Ave., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Koppers Co., The, Pittsburgh, Pa.

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GAUGES (Welding)
Oxweld Acetylene Co., Newark, N. J.

GEAR BLANKS
Bethlehem Steel Co., Bethlehem, Pa.
Ladish Drop Forge Co., Cudahy, Wis.
Transue & Williams Steel Forging Corp.,
Alliance, Ohio.

GEARS AND GEAR CUTTING
Link-Belt Co.,
910 S. Michigan Ave., Chicago, Ill.

GEARS AND GEAR CUTTING (Iron & Steel)
Albaugh-Dover Mfg. Co.,
2102 Marshall Blvd., Chicago, Ill.
American Adamite Co., The,
311 Oliver Bldg., Pittsburgh, Pa.
Connecticut Gears, Inc., Waterbury, Conn.
Fawcus Machine Co.,
2818 Smallman St., Pittsburgh, Pa.
Foote Bros. Gear & Machine Co.,
220-230 N. Curtis St., Chicago, Ill.
Ganschow, Wm., Co.,
24 N. Morgan St., Chicago, Ill.
Horsburgh & Scott Co.,
5114 Hamilton Ave., Cleveland, O.
Johnson, Carlyle, Machine Co.,
Manchester, Conn.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Ross-Meehan Foundries, Chattanooga, Tenn.
Simonds Mfg. Co.,
25th St. & Liberty Ave., Pittsburgh, Pa.
Stroh Steel Hardening Process Co.,
Westinghouse Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

GEARS (Bakelite)
Ganschow, Wm., Co.,
24 N. Morgan St., Chicago, Ill.

GEARS (Bevel-Generated Tooth)
Albaugh-Dover Mfg. Co.,
2102 Marshall Blvd., Chicago, Ill.
Ganschow, Wm., Co.,
24 N. Morgan St., Chicago, Ill.

GEARS (Herringbone)
Farrel Foundry & Machine Co.,
344 Vulcan St., Buffalo, N. Y.
Fawcus Machine Co.,
2818 Smallman St., Pittsburgh, Pa.

GEARS (Machine Cut)
Foote Bros. Gear & Machine Co.,
220-230 N. Curtis St., Chicago, Ill.

GEARS (Machine Molded)
Taylor-Wilson Manufacturing Co.,
McKees Rocks, Pa.

GEARS (Miter, Ring, Spiral, Worm)
Ganschow, Wm., Co.,
24 N. Morgan St. Chicago, Ill.

GEARS (Rawhide)
Chicago Rawhide Mfg. Co.,
1305 Elston Ave., Chicago, Ill.
Ganschow, Wm., Co.,
24 N. Morgan St., Chicago, Ill.
Horsburgh & Scott Co.,
5114 Hamilton Ave., Cleveland, O.

GEARS (Reverse Marine)
General Electric Co., Schenectady, N. Y.
Johnson, Carlyle, Machine Co.,
Manchester, Conn.

GEARS (Spur and Worm)
Foote Bros. Gear & Machine Co.,
220-230 N. Curtis St., Chicago, Ill.

GENERATING SETS
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.

GENERATORS (Direct and Alternate Current)
Castle & Wilson,
1601 Arnott Bldg., Pittsburgh, Pa.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

GLOVES (Asbestos)
Oxweld Acetylene Co., Newark, N. J.

GLOVES (Steel Grip)
Industrial Gloves Corp.,
1213 Fullerton Ave., Chicago, Ill.

GRATES (Shaking and Interlocking)
Armstrong Mfg. Co., The,
Liberty & Penn R. R., Springfield, Ohio.

GRATING (Flooring, Subway, Step and Other Purposes)
Irving Iron Works,
Long Island City, N. Y.

GRATING-STEEL (Subway, Area, Sidewalk, Ventilation)
Irving Iron Works, Long Island City, N. Y.

GRINDERS (Crankshaft)
Landis Tool Co., Waynesboro, Pa.

GRINDERS (Electric-Pneumatic-Portable)
Chicago Pneumatic Tool Co.,
6 East 44th St., New York City.
Cleveland Pneumatic Tool Co.,
3734 E. 78th St., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway,
New York City.

GRINDERS (Roll)
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES
Landis Tool Co., Waynesboro, Pa.

GRINDING PANS
Clearfield Machine Co., Clearfield, Pa.
National Engineering Co.,
549 W. Washington Blvd., Chicago, Ill.
Phillips & McLaren Co., Pittsburgh, Pa.

GRINDING WHEELS
Cortland Grinding Wheel Co., Chester, Mass.

GUARDS (Truck Radiator)
Irving Iron Works, Long Island City, N. Y.

HAMMERS (Chipping, Riveting and Calking)
Chicago Pneumatic Tool Co.,
6 East 44th St., New York City.
Cleveland Pneumatic Tool Co.,
3734 E. 78th St. Cleveland, O.
Ingersoll-Rand Co., 11 Broadway,
New York City.

HAMMERS (Drop)
Beaudry Co., 1842 Parkway, Everett, Mass.
Bliss, E. W., Co.,
53rd St. and 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Long & Allstatter Co., Hamilton, Ohio.
Moloch Co., The, Kaukauna, Wis.
Morgan Engineering Co., The, Alliance, Ohio.
Toledo Machine & Tool Co., Toledo, O.

HAMMERS (Power)
Bradley, C. C., & Son, Inc., Syracuse, N. Y.
Cleveland Punch & Shear Works,
Cleveland, O.
Erie Foundry Co., Erie, Pa.
Moloch Co., The, Kaukauna, Wis.
Yoder Co., The,
5510 Walworth St., Cleveland, O.

HAMMERS (Rawhide)
Chicago Rawhide Mfg. Co.,
1305 Elston Ave., Chicago, Ill.

HAMMERS (Steam)
Erie Foundry Co., Erie, Pa.
Morgan Engineering Co., The, Alliance, O.

HANGERS (Door)
Myers, F. E., & Brother Co., The,
Ashland, Ohio.

HANGERS (Shaft)
Hyatt Roller Bearing Co., Newark, N. J.

HARDWARE
Chicago Forging & Mfg. Co.,
2004 Southport Ave., Chicago, Ill.

HEAT TREATING (Commercial)
Lakeside Steel Improvement Co., The,
5418 Lakeside Ave., Cleveland, Ohio.

HOISTING MACHINERY
Brown Hoisting Machinery Co.,
4403 St. Clair Ave., Cleveland, Ohio.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Illinois Malleable Iron Co.,
180 Diversey Blvd., Chicago, Ill.
Machinery Exchange, Seattle, Wash.
McMyler-Interstate Co., Bedford, O.
Orton & Steinbrenner Co.,
608 Dearborn St., Chicago, Ill.
Shepard Electric Crane & Hoist Co.,
358 Schuyler Ave., Montour Falls, N. Y.
Treadwell Engineering Co., Easton, Pa.

HOISTS (Electric)
Box, Alfred, Co., Janney & E. Ontario St.,
Philadelphia, Pa.
General Electric Co., Schenectady, N. Y.
Link-Belt Co., Chicago, Ill.
Milwaukee Electric Crane & Mfg. Co.,
Milwaukee, Wis.
Pawling & Harnischfeger Co.,
39th and National, Milwaukee, Wis.
Shepard Electric Crane & Hoist Co.,
358 Schuyler Ave., Montour Falls, N. Y.

HOISTS (Pneumatic)
Chicago Pneumatic Tool Co.,
6 East 44th St., New York City.
Hanna Engineering Works,
1765 Elston Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway,
New York City.
Whiting Corp., Harvey, Ill.

HOLDERS (Tool)—See TOOL HOLDERS

HOOPS AND BANDS
Acme Steel Goods Co.,
2840 Archer Ave., Chicago, Ill.
Bourne-Fuller Co.,
Hanna Bldg., Cleveland, O.
Morris, Wheeler & Co.,
30th and Locust Sts., Philadelphia, Pa.
Ryerson, Joseph T., & Son, Inc.,
16th and Rockwell Sts., Chicago, Ill.
West Leechburg Steel Co., Pittsburgh, Pa.

HOOPS AND BANDS (Strips)
Sharon Steel Hoop Co., Sharon, Pa.

HOOPS, BANDS AND SHAPES (Galvanized)
McCalla, Harold, Co., The,
Beach St. and E. Columbia Ave.,
Philadelphia, Pa.

HOSE (Pneumatic)
Chicago Pneumatic Tool Co.,
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Morgan Construction Co., Worcester, Mass.
Treadwell Engineering Co., Easton, Pa.

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Riter-Conley Co.,
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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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Chambersburg Engineering Co.,
Chambersburg, Pa.
Morgan Engineering Co., The, Alliance, O.
United Engineering & Foundry Co.,
Farmers Bank Bldg., Pittsburgh, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

INDUSTRIAL HAULAGE EQUIPMENT
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Birdsboro Steel Fdy. & Mach. Co.,
Birdsboro, Pa.
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Sharpsville, Pa.
Vulcan Mold & Iron Co., Latrobe, Pa.

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Penn Iron & Steel Co., Creighton, Pa.

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Brown-Wales Co., 493 C St., Boston, Mass.
Lockhart Iron & Steel Co., Pittsburgh, Pa.

IRON (Chain)
Bethlehem Steel Co., Bethlehem, Pa.
Penn Iron & Steel Co., Creighton, Pa.

IRON (Engine Bolt)
Bethlehem Steel Co., Bethlehem, Pa.

IRON (Norway)
Brown-Wales Co., 493 C St., Boston, Mass.

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Keokuk Electro-Metals Co., Keokuk, Iowa.

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IRON (Staybolt)
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Penn Iron & Steel Co., Creighton, Pa.

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First Nat'l Bank Bldg., Pittsburgh, Pa.
Marquette Ore Co.,
Rockefeller Bldg., Cleveland, O.

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Tod-Stambaugh Co.,
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Central Steel Co., Massillon, Ohio.
Truscon Steel Co., Youngstown, Ohio.

KETTLES (Galvanizing)
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Morton Mfg. Co., Muskegon Heights, Mich.
Standard Gauge Steel Co., Beaver Falls, Pa.

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Morton Mfg. Co., Muskegon Heights, Mich.

KNIVES AND SHEAR BLADES—See SHEAR BLADES AND KNIVES

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Farmers Bank Bldg., Pittsburgh, Pa.

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LOCOMOTIVE CRANES—See CRANES (Locomotive)

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Weyerhaeuser Forest Products Co.,
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LUMBER (Templet)
Weyerhaeuser Forest Products Co.,
St. Paul, Minn.

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Morey & Co., Inc.,
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Potts, Henry, & Co.,
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METAL STAMPINGS—See STAMPINGS

METAL WORKING MACHINES — SEE SHEET METAL WORKING MACHINERY

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Connersville, Ind.
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OVENS (Coke By-Product Recovery)
Koppers Co., The, Pittsburgh, Pa.

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Logemann Brothers Co., 3120 Burleigh St., Milwaukee, Wis.
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Youngstown Sheet & Tube Co., Youngstown, O.

PLATES—(Terne and Tin)—See TIN PLATE

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PNEUMATIC TOOLS—See TOOLS (Pneumatic)

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PRESSED STEEL PARTS—See STAMPINGS

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Logemann Brothers Co., 3120 Burleigh Ave., Milwaukee, Wis.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, Ohio.
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PRESSES (Roofing & Corrugating)
Streine Tool & Mfg. Co., The, New Bremen, Ohio.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3120 Burleigh Ave., Milwaukee, Wis.

PRESSES (Shaft and Pipe Straightening—Hydraulic)
Logemann Bros. Co. 3120 Burleigh St., Milwaukee, Wis.

PRESSES (Straightening)
Chambersburg Engineering Co., Chambersburg, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Trimming)
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Wheel)
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PULLEYS (Magnetic)
Magnetic Mfg. Co., 278 Twenty-fourth Ave., Milwaukee, Wis.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Connersville Blower Co., The, Connersville, Ind.

PUMPS (Boiler Feed)
Ingersoll-Rand Co., 11 Broadway, New York.

PUMPS (Centrifugal)
Ingersoll-Rand Co., 11 Broadway, New York.
Kane & Roach, Niagara and Shonnard Sts., Syracuse, N. Y.

PUMPS (Hand & Power)
Myers, F. E., & Brother Co., The, Ashland, Ohio.

PUMPS (Hydraulic)
Logemann Brothers Co., 3120 Burleigh Ave., Milwaukee, Wis.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUNCHES (Multiple)
Thomas Spacing Machine Co., Fulton Bldg., Pittsburgh, Pa.

PUNCHES AND DIES
Cleveland Steel Tool Corp., The, 660 East 82nd St., Cleveland, O.
Marchant, George F., Co., 1434 Rockwell St., Chicago, Ill.
Richards, I. P., Co., Providence, R. I.

PUNCHING AND SHEARING MACHINERY
Bliss, E. W. Co., 53rd St., and 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works, Cleveland, O.
Long & Allstatter Co., Hamilton, O.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Wood, R. D., & Co., 400 Chestnut St., Philadelphia, Pa.

RACKS (Machine)
Ganschow, Wm. Co., 42 N. Morgan St., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.

RAILS
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Foster, L. B., Co., Pittsburgh, Pa.
Frank, M. K., Union Trust Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

RAILS (Girder)
Bethlehem Steel Co., Bethlehem, Pa.

REAMERS
Cleveland Twist Drill Co., The, Lakeside Ave., and E. 49th St., Cleveland, Ohio.

REDUCERS (Speed-Worm & Spur) See Speed Reducers (Worm & Spur)

REFRACTORIES
Ashland Fire Brick Co., Ashland, Ky.
Bour, L. J., Refractories Co., Inc., The, Scranton, Pa.
Brighton Fire Brick Co, Block House Run, New Brighton, Pa.
Crescent Refractories Co., Curwensville, Pa.
Dover Fire Brick Co., 830 Cuyahoga Bldg., Cleveland, O.
General Refractories Co., 117 S. 16th St., Philadelphia, Pa.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh Pa.
Ironton Fire Brick Co., The, Ironton, O.
Kier Fire Brick Co., Oliver Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., St. Louis, Mo.
Lavino, E. J., & Co., Bullitt Bldg., Philadelphia, Pa.
Pyro Clay Products Co., The, Oak Hill, Ohio.
Queen's Run Refractories Co., Inc., Lock Haven, Pa.
Soisson, Joseph, Fire Brick Co., Connellsville, Pa.
Stowe-Fuller Refractories Co., The, 1650 Union Trust Bldg., Cleveland, O.
Superior Basic Brick Co., 517 Bessemer Bldg., Pittsburgh, Pa.
Union Mining Co., 1113 Fidelity Bldg., Baltimore, Md.
United States Refractories Corp., Mt. Union, Pa.

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Oxweld Acetylene Co., Newark, N. J.

REINFORCEMENTS (Steel)
Truscon Steel Co., Youngstown, Ohio.

RESISTANCE MATERIAL
Driver-Harris Co., Harrison, N. J.

RHEOSTATS
Electric Controller & Mfg. Co., Cleveland, O.

RINGS (Mud for Upright Boilers)
Akron-Selle Co., Akron, O.

RINGS (Welded Iron & Steel)
Akron-Selle Co., Akron, O.

RINGS (Weldless, Forged)
Cann & Saul Steel Co., 516 Commerce St., Philadelphia, Pa.

RIVETERS (Pneumatic)
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

RIVETING MACHINERY
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, The F. B., Co., New Haven, Conn.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVET HEATERS (Electric)
American Car & Foundry Co., 165 Broadway, New York City.
General Electric Co., Schenectady, N. Y.

RIVET SETS
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, O.
Hunter Saw & Machine Co., 57th and Butler Sts., Pittsburgh, Pa.
Marchant, George F., Co., 1434 S. Rockwell, Chicago, Ill.

RIVETS
Bethlehem Steel Co., Bethlehem, Pa.
Champion Rivet Co., E. 108th St., and Harvard Ave. Cleveland Ohio.
Illinois Steel Warehouse Co., Chicago, Ill.
Pacific Coast Forge Co., 3800 Iowa Ave., Seattle, Wash.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

RODS (Drill)
Kidd Drawn Steel Co., Alikuippa, Pa.
National Drawn Steel Co., E. Liverpool, O.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.

RODS (Drill High Speed)
Anchor Drawn Steel Co., Latrobe, Pa.

RODS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.

RODS (Welding)—See WELDING RODS

ROD MILLS
Morgan Construction Co., Worcester, Mass.
Treadwell Engineering Co., Easton, Pa.
Vaughn Machinery Co., The, Cuyahoga Falls, O.

ROLLING DOORS AND SHUTTERS
Kinnear Manufacturing Co., 818-868 Field Ave., Columbus, O.

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Hyatt Roller Bearing Co., Newark, N. J.
Norma-Hoffman Bearing Corp., Anable Ave., Long Island City, N. Y.

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Alliance Machine Co., Alliance, Ohio.
Birdsboro Steel Fdry. & Machine Co., Birdsboro, Pa.
Blake & Johnson Co., The, 185 N. Elm St., Waterbury, Conn.
Farrel Foundry & Machine Co. 344 Vulcan St., Buffalo, N. Y.
Hubbard Steel Foundry Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Kane & Roach, Niagara and Shonnard Sts., Syracuse, N. Y.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Mesta Machine Co., West Homestead, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., Avonmore, Pa.
Standard Engineering Co., Ellwood City, Pa.
Sutton-Abramsen Engrg. Co., Park Bldg., Pittsburgh, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wheeling Mold & Foundry Co., Wheeling, W. Va.

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Chapman-Stein Furnace Co., Mt. Vernon, Ohio.

ROLLING MILLS (Consulting Engineers)
Morgan Construction Co., Worcester, Mass.
Treadwell Engineering Co., Easton, Pa.

ROLLING MILLS (Contracting Engineers)
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

ROLLS
American Adamite Co., The, 311 Oliver Bldg., Pittsburgh, Pa.
Hyde Park Fdry. & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Mesta Machine Co., West Homestead, Pa.
Otis Steel Co., The, 3300 Jennings Rd., Cleveland, Ohio.
Pittsburgh Rolls Corp., 41st St. and A. V. Ry., Pittsburgh, Pa.
Pollak Steel Co., The, Cincinnati, Ohio.
Standard Engrg. Co., Ellwood City, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wheeling Mold & Foundry Co., Wheeling, W. Va.

ROLLS (Bending and Straightening)
Pollak Steel Co., The, Cincinnati, O.

ROLLS (Hardened Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Midvale Co., The, 4320 Wissahickon Ave., Philadelphia, Pa.
Pittsburgh Rolls Corp., 41st St. and A. V. Ry., Pittsburgh, Pa.
Wheeling Mold & Foundry Co., Wheeling, W. Va.

ROLLS (Sand Chilled and Steel)
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
Hubbard Steel Foundry Co., East Chicago, Ind.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
National Roll & Foundry Co., Avonmore, Pa.
Pittsburgh Rolls Corp., 41st St. and A. V. Ry., Pittsburgh, Pa.
United Engineering & Foundry Co., Farmers Bank Bldg., Pittsburgh, Pa.
Wheeling Mold & Foundry Co., Wheeling, W. Va.

ROLLS (Special)
Pittsburgh Rolls Corp., 41st St. and A. V. Ry., Pittsburgh, Pa.

ROLLS (Wood)
Dart, E. M., Mfg. Co., Providence, R. I.

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American Sheet & Tin Plate Co., Pittsburgh, Pa.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Newport Rolling Mill Co., Newport, Ky.

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SAFETY STEPS AND TREADS
Irving Iron Works, Long Island City, N. Y.

SAND
Portage Silica Co., The,
602 Stambaugh Bldg., Youngstown, O.
United States Silica Co.,
122 South Michigan Ave., Chicago, Ill.

SAND (Molding)
Rogers, Brown & Co., Cincinnati, O.

SAND (Sandblast)
Otis Steel Co.,
Leader-News Bldg., Cleveland, O.
Portage Silica Co., The,
602 Stambaugh Bldg., Youngstown, O.
United States Silica Co.,
122 South Michigan Ave., Chicago, Ill.

SAND BLAST ABRASIVES (Shot and Grit)
Pittsburgh Crushed Steel Co.,
61st & A. V. R. R., Pittsburgh, Pa.

SAND BLAST EQUIPMENT AND ACCESSORIES
American Foundry Equipment Co.,
Madison Ave. and 46th St., New York City.
Koven, L. O., & Brother, Inc.,
152 Ogden St., Jersey City, N. J.
Pangborn Corporation,
P. O. Box 858, Hagerstown, Md.
Sly, W. W., Mfg. Co.,
4700 Train Ave., Cleveland, O.

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Bartlett & Snow, C. O., Co., Cleveland, O.
Link-Belt Co., Chicago, Ill.
Standard Sand & Machine Co.,
5151 St. Clair Ave., Cleveland, O.

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American Foundry Equipment Co.,
Madison Ave. & 46th St., New York City.
National Engineering Co.,
549 W. Washington Blvd., Chicago, Ill.
Standard Sand & Machine Co., Cleveland, O.
Whiting Corp., Harvey, Ill.

SAND MIXERS (Core and Facing Sand)
National Engineering Co.,
549 W. Washington Blvd., Chicago, Ill.
Standard Sand & Machine Co.,
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Beardsley & Piper Co.,
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SASH (Steel Casement)
Truscon Steel Co., Youngstown, Ohio.

SAW SHARPENING MACHINES
Hunter Saw & Machine Co.,
57th and Butler Sts., Pittsburgh, Pa.

SAWS (Cold and Hot Metal)
Hunter Saw & Machine Co.,
57th and Butler Sts., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
United Engineering & Foundry Co.,
Farmers Bank Bldg., Pittsburgh, Pa.

SCRAP
Agnew, Batteiger & Co.,
1630-32 Widener Bldg., Philadelphia, Pa.

SCRAP BALING PRESSES
Logemann Bros. Co.,
3120 Burleigh Ave., Milwaukee, Wis.

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Vaughn Machinery Co., The,
Cuyahoga Falls, O.

SCRATCH BRUSHES
Herold Brothers Co.,
1104 W. 9th St., Cleveland, Ohio.

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Chicago Perforating Co.,
2445 W. 24th Place, Chicago, Ill.

SCREENS AND SIEVES
Erdle Perforating Co.,
171 York St., Rochester, N. Y.
Hendrick Mfg. Co., The, Carbondale, Pa.

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Cleveland Twist Drill Co., The,
Lakeside Ave and E. 49th St.,
Cleveland, Ohio.

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Link-Belt Co.,
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Milford Mfg. Co., The,
33 Buckingham Ave., Milford, Conn.
Park Mfg. Co., Worcester, Mass.
Scovill Mfg. Co., Waterbury, Conn.

SCREW STOCK (Cold Drawn)
Lancaster Steel Products Corp., Lancaster, Pa.
Peerless Drawn Steel Co., The, Massillon, O.
Union Drawn Steel Co., Beaver Falls, Pa.

SCREW STOCK (Free Cutting)
Peerless Drawn Steel Co., The, Massillon, O.
Union Drawn Steel Co., Beaver Falls, Pa.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SCREWS
Clark Bros. Bolt Co., Milldale, Conn.
Progressive Mfg. Co., Torrington, Conn.

SCREWS (Cap and Heat Treated)
Rhode Island Tool Co., Providence, R. I.

SCREWS (Cap and Set)
Scovill Mfg. Co., Waterbury, Conn.

SEAMERS (Automatic, Double)
Ams, Max, Machine Co.,
101 Park Ave., New York City.

SEAMLESS STEEL TUBING—See TUBES (Cold Drawn Seamless Steel)

SEPARATORS (Magnetic)
Magnetic Mfg. Co.,
278 Twenty-fourth Ave., Milwaukee, Wis.

SHAFT AND PIPE STRAIGHTENERS (Hydraulic)
Logemann Brothers Co.,
3120 Burleigh Ave., Milwaukee, Wis.

SHAFT HANGERS
Hyatt Roller Bearing Co., Newark, N. J.

SHAFTING
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Morris, Wheeler & Co.,
30th and Locust Sts., Philadelphia, Pa.
National Tube Co.,
Frick Bldg., Pittsburgh, Pa.
Pollak Steel Co., The, Cincinnati, Ohio.
Ryerson, Jos. T., & Son, Inc.,
16th and Rockwell Sts., Chicago, Ill.
Vanadium Corp. of America,
120 Broadway, New York City.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

SHAFTING (Cold Drawn and Turned)
Bethlehem Steel Co., Bethlehem, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.

SHAFTING (Turned & Polished)
Peerless Drawn Steel Co., The, Massillon, O.

SHAPERS—See PLANERS AND SHAPERS

SHAPES (Steel)—See STEEL (Structural)

SHAPES (Round, Squares, Hexagon)
Union Drawn Steel Co., Beaver Falls, Pa.

SHAPES (Special)
Sharon Steel Hoop Co., Sharon, Pa.
Walsh & McGee Steel Co.,
2 Rector St., New York City.

SHEAR BLADES AND KNIVES
Cleveland Knife & Forge Co.,
1960 West 114th St., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburgh, Pa.
Marchant, George F., Co.,
1434 S. Rockwell, Chicago, Ill.
Pittsburgh Knife & Forge Co., Pittsburgh, Pa.

SHEARS
Bliss, E. W., Co.,
53rd St. and 2nd Ave., Brooklyn, N. Y.
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Co.,
Farmers Bank Bldg., Pittsburgh, Pa.
Mackintosh-Hemphill Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, Ohio.
National Roll & Foundry Co., Avonmore, Pa.
Quickwork Co., The, St. Marys, Ohio.
Ryerson, Jos. T., & Son, Inc.,
16th and Rockwell Sts., Chicago, Ill.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdry. Co.,
Farmers Bank Bldg., Pittsburgh, Pa.
Yoder Co., The,
5510 Walworth St., Cleveland, O.

SHEARS (Beveling)
Quickwork Co., The, St. Marys, Ohio.

SHEARS (Circular, Plate, Rotary, Serpentine)
Quickwork Co., The, St. Marys, Ohio.

SHEARS (Doubling & Squaring)
Streine Tool & Mfg. Co., The,
New Bremen, Ohio.

SHEARS (Metal Slitting)
Streine Tool & Mfg. Co., The,
New Bremen, Ohio.

SHEARS (Plate)
Streine Tool & Mfg. Co., The,
New Bremen, Ohio.

SHEARS (Straight Slitting)
Quickwork Co., The, St. Marys, Ohio.

SHEET BARS
Andrews Steel Co., Newport, Ky.
Lewis Foundry & Machine Co.,
Farmers Bank Bldg., Pittsburgh, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Mansfield Sheet & Tin Plate Co., The,
Mansfield, Ohio.
Wheeling Steel Corp., Wheeling, W. Va.

SHEET METAL STRAIGHTENERS
Shuster, The F. B., Co., New Haven, Conn.

SHEET METAL WORK
Crosby Co., 183 Pratt St., Buffalo, N. Y.

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101 Park Ave., New York City.
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7408 Loomis St., Chicago, Ill.
Quickwork Co., The, St. Marys, Ohio.
Streine Tool & Mfg. Co., The,
New Bremen, Ohio.
Toledo Machine & Tool Co., Toledo, Ohio.
Yoder Co., The,
5510 Walworth St., Cleveland, O.

SHEETS
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co.,
Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Central Steel Co., Massillon, Ohio.
Columbia Steel Corp.,
Balfour Building, San Francisco, Cal.
Inland Steel Co.,
First National Bank Bldg., Chicago, Ill.
Mansfield Sheet & Tin Plate Co., The,
Mansfield, Ohio.
Morris & Bailey Steel Division, Oliver Iron & Steel Corp.,
Wilson Station, Pittsburgh, Pa.
Morris, Wheeler & Co.,
30th and Locust Sts., Philadelphia, Pa.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Jos. T., & Son, Inc.
16th and Rockwell Sts., Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Sheet Steel Trade Extension Committee,
Chicago, Ill.
Trumbull Steel Co., The, Warren, Ohio.

SHEETS (Automobile)
Allegheny Steel Co., Pittsburgh, Pa.
American Rolling Mill Co., Middletown, Ohio.
American Sheet & Tin Plate Co.,
Frick Bldg., Pittsburgh, Pa.
Central Steel Co., Massillon, Ohio.
Mansfield Sheet & Tin Plate Co., The,
Mansfield, Ohio.
Otis Steel Co., The,
3300 Jennings Rd., Cleveland, Ohio.
Seneca Iron & Steel Co., Buffalo, N. Y.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Black)
American Sheet & Tin Plate Co.,
Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Mansfield Sheet & Tin Plate Co., The,
Mansfield, Ohio.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Youngstown, O.
Seneca Iron & Steel Co., Buffalo, N. Y.
Weirton Steel Co., Weirton, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co.,
Youngstown, O.

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American Rolling Mill Co., Middletown, Ohio.
American Sheet & Tin Plate Co.,
Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Central Steel Co., Massillon, Ohio.
Mansfield Sheet & Tin Plate Co., The,
Mansfield, O.
Newport Rolling Mill Co., Newport, Ky.
Otis Steel Co., The,
3300 Jennings Rd., Cleveland, Ohio.
Republic Iron & Steel Co., Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa.

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DIE BLOCKS
SHEAR KNIVES

Heppenstall Forge & Knife Co.
Pittsburgh WORKS Bridgeport
Offices in Principal Cities

SHEETS (Blue Annealed)
Tennessee Coal, Iron & Railroad Co., 1351 Brown-Marx Bldg., Birmingham, Ala.
Trumbull Steel Co., The, Warren, Ohio.
Wheeling Steel Corp., Wheeling, W. Va.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.

SHEETS (Box Annealed)
Sharon Steel Hoop Co., Sharon, Pa.

SHEETS (Corrugated)
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.,

SHEETS (Electrical)
Allegheny Steel Co., Pittsburgh, Pa.
American Rolling Mill Co., Middletown, Ohio.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Central Steel Co., Massillon, Ohio.
Mansfield Sheet & Tin Plate Co., The, Mansfield, Ohio.
Trumbull Steel Co., The, Warren, Ohio.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Galvanized)
American Rolling Mill Co., Middletown, Ohio.
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Morris, Wheeler & Co., 30th & Locust Streets, Philadelphia, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Co., 22 Battery St., San Francisco, Cal.
Trumbull Steel Co., The, Warren, Ohio.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Perforated)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Steel)
Ducommon Corporation, 219 S. Central Ave., Los Angeles, Cal.

SHEETS (Tin)—See TIN PLATE

SHELVING (Steel)
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.

SHIPBUILDING SHAPES
Bethlehem Steel Co., Bethlehem, Pa.

SHOES (Molders' Safety)
Safety First Shoe Co., 119 Summer St., Boston, Mass.

SHOES (Workmen's)
Safety First Shoe Co., 119 Summer St., Boston, Mass.

SHOVELS
Wood Shovel & Tool Co., Piqua, Ohio.

SLABS
Andrews Steel Co., Newport, Ky.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Mansfield Sheet & Tin Plate Co., The, Mansfield, Ohio.
Wheeling Steel Corp., Wheeling, W. Va.

SLEEVES AND NOZZLES
Bessemer Brick Co., Monongahela, Pa.

SLITTING MACHINERY
Blake & Johnson Co., The, 185 N. Elm St., Waterbury, Conn.

SOAKING PITS
Chapman-Stein Furnace Co., Mt. Vernon, O.

SPACING TABLES
Thomas Spacing Machine Co., Fulton Bldg., Pittsburgh, Pa.

SPECIAL MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Lammert & Mann Co., Chicago, Ill.
Moloch Co., The, Kaukauna, Wis.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., Avonmore, Pa.
Smith Gas Engineering Co. Dayton, Ohio.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

SPECIAL SHAPES
Sharon Steel Hoop Co., Sharon, Pa.

SPECIAL SHAPES (Cold Drawn)
Peerless Drawn Steel Co., The, Massillon, O.

SPEED REDUCERS (Worm & Spur)
Foote Bros. Gear & Machine Co., 220-230 N. Curtis St., Chicago, Ill.
Ganschow, Wm., Co., 42 N. Morgan St., Chicago, Ill.

SPIEGELEISEN
Leavitt, C. W., & Co., 30 Church St., New York City.
New Jersey Zinc Sales Co., Maiden Lane and Front St., New York City.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

SPIKES
Bethlehem Steel Co., Bethlehem, Pa.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.

SPINDLES (Lathe Bored)
American Hollow Boring Co., 1055 West 19th St., Erie, Pa.

SPRINGS
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Gibson, Wm., D., Co., 1800 Clybourn Ave., Chicago, Ill.
Raymond Mfg. Co., Corry, Pa.
Vanadium Corp. of America, 120 Broadway, New York City.
Wickwire Spencer Steel Corp., 11 E. 42nd St., New York City.

SPRINGS (Coil and Flat)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Gibson, Wm. D., Co., 1800 Clybourn Ave., Chicago, Ill.

SPRING COILING MACHINERY
Sleeper & Hartley, Inc., 335 Chandler St., Worcester, Mass.

SPRUE CUTTERS
Shuster, The F. B., Co., New Haven, Conn.

STACKS (Steel)
American Bridge Co., 71 Broadway, New York City.
Heltzel Steel Form & Iron Co., The, Warren, Ohio.
Hendrick Manufacturing Co., Carbondale, Pa.
Sotter Bros., Inc., Pottstown, Pa.

STAIR STEPS AND TREADS (Nonslipping)
Irving Iron Works, Long Island City, N. Y.

STAMPINGS
Allegheny Steel Co., Pittsburgh, Pa.
Bliss, E. W., Co., 53rd St. and 2nd Ave., Brooklyn, N. Y.
Crosby Co., 183 Pratt St., Buffalo, N. Y.
Denning Mfg. Co., 1777 E. 87th St., Cleveland, Ohio.
Newton Pressed Steel & Mfg. Co., Newton, Mass.
Truscon Steel Co., Youngstown, Ohio.

STAMPINGS (Aluminum, Bronze, Copper, Brass, Steel)
Akron-Selle Co., Akron, Ohio.
Chicago Forging & Mfg. Co., 2004 Southport Ave., Chicago, Ill.
Scovill Mfg. Co., Waterbury, Conn.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., Cleveland. O.

STEAMSHIP LINES
McCormick Steamship Co., San Francisco., Cal.

STEAM SPECIALTIES
Crane Co., The, 836 S. Michigan Ave., Chicago, Ill.

STEEL
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Central Steel Co., The, Massillon, Ohio.
Daub, W. H., & Co., Inc., Alaska Bldg., Seattle, Wash.
Gulf States Steel Co., Birmingham, Ala.
Illinois Steel Co., 208 So. La Salle St., Chicago, Ill.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago, Ill.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Joseph Casse, 369 Pine St., San Francisco, Cal.
Judson Mfg. Co., 604 Mission St., San Francisco, Cal.
Kidd Drawn Steel Co., Aliquippa, Pa.
Lockhart Iron & Steel Co., Aliquippa, Pa.
Lukens Steel Co., Coatesville, Pa.
Pacific Coast Steel Co., San Francisco, Cal.
Phillips, F. R., & Sons Co., Pennsylvania Bldg., Philadelphia, Pa.
Pike, C. W., Co., 22 Battery St., San Francisco, Cal.
Pray, Milton, Co., Monadnock Bldg., San Francisco, Cal.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Walsh & McGee Steel Co., 2 Rector St., New York City.
West Leechburg Steel Co., Pittsburgh. Pa
Wickwire Spencer Steel Corp., 41 E. 42nd St., New York City
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL (Agricultural)
Bethlehem Steel Co., Bethlehem, Pa.
Pollak Steel Co., The, Cincinnati, O.

STEEL (Alloy)
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Central Steel Co., Massillon, Ohio.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Harrisburg Pipe and Pipe Bending Co., Harrisburg, Pa.
Hawkridge Bros., Congress St., Boston, Mass.
Interstate Iron & Steel Co., 104 S. Michigan Ave., Chicago, Ill.
Lancaster Steel Products Corp., Lancaster, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Vanadium Corp. of America, 120 Broadway, New York City.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL (Alloy, Cold Drawn)
Peerless Drawn Steel Co., The, Massillon, O.

STEEL (Cold Drawn)
Anchor Drawn Steel Co., Latrobe, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Hawkridge Bros., Congress St., Boston, Mass.
Kidd Drawn Steel Co., Aliquippa, Pa.
Lancaster Steel Products Corp., Lancaster, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Peerless Drawn Steel Co., The, Massillon, O.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL (Crucible)
Carpenter Steel Co., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkridge Bros., Congress St., Boston, Mass.
Pittsburgh Cold Rolled Steel Co., Verona, Pa.

STEEL (Drill)
Ziv Steel & Wire Co., 4423 W. Kinzie St., Chicago, Ill.

STEEL (High Speed)
Braeburn Alloy Steel Corp., Braeburn (Pittsburgh District), Pa.
Carpenter Steel Co., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL (Open Hearth)
Central Steel Co., Massillon, Ohio.
Gulf States Steel Co., Brown-Marx Bldg., Birmingham, Ala.
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Open-hearth—Cold Drawn)
Lancaster Steel Products Corp., Lancaster, Pa.
Union Drawn Steel Co., Beaver Falls, Pa.

STEEL (Rustless)
Carpenter Steel Co., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Screw Stock)
Peerless Drawn Steel Co., The, Massillon, O.

STEEL (Spring)
Bethlehem Steel Co., Bethlehem, Pa.
Central Steel Co., Massillon, Ohio.
Donner Steel Co., Inc., P. O. Box 1000, Buffalo, N. Y.

STEEL (Stainless)
Carpenter Steel Co., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Stamping and Drawing)
Columbia Steel Co., Elyria, Ohio.
Greer Steel Co., Dover, Ohio.
Griffin Mfg. Co., 15th and Cherry Sts., Erie, Pa.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.

STEEL (Strip, Hot and Cold Rolled)
Acme Steel Goods Co., 2840 Archer Ave., Chicago, Ill.
Central Steel Co., Massillon, Ohio.
Columbia Steel Co., The, Elyria, O.
Driver-Harris Co., Harrison, N. J.
Greer Steel Co., Dover, Ohio.
Griffin Mfg. Co., 15th and Cherry Sts., Erie, Pa.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

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CORE RING BLANKS
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This book illustrates and describes hundreds of typical grinding operations, giving full data as to the wheels used, grinding output, methods of handling, etc. It also illustrates and describes a variety of special fixtures and appliances for handling grinding room work. As a ready reference book, it is invaluable for checking production figures by the representative operations included.
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Book Department 501 I.P.A.
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STEEL (Strip, Hot and Cold Rolled) Continued
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Lancaster Steel Products Corp., Lancaster, Pa.
Morris & Bailey Steel Division, Oliver Iron & Steel Corp., Wilson Station, Pittsburgh, Pa.
Otis Steel Co., The, 3300 Jennings Rd., Cleveland, Ohio.
Pittsburgh Cold Rolled Steel Co., Verona, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanford Steel Corp., Milford, Conn.
Superior Steel Corp., Union Trust Bldg., Pittsburgh, Pa.
Trumbull Steel Co., The, Warren, Ohio.
Weirton Steel Co., Weirton, W. Va.
West Leechburg Steel Co., Pittsburgh, Pa.

STEEL (Structural)
Alliance Structural Co., Alliance, Ohio.
American Bridge Co., 71 Broadway, New York City.
Belmont Iron Works, 22nd & Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Dyer Bros. Golden West Iron Works, Inc., 1950 17th St., San Francisco, Cal.
Eichleay, John, Jr., Co., So. 20th and Wharton, Pittsburgh, Pa.
Erie Steel Construction Co., The, Erie, Pa.
Illinois Steel Warehouse Co., 1319 Wabansia Ave., Chicago, Ill.
Kratzer, W. N., Co., 3212 Smallman St., Pittsburgh, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
McClintic-Marshall Co., Oliver Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Morris, Wheeler & Co., 30th and Locust Sts., Philadelphia, Pa.
Ohio Structural Steel Co., The, Newton Falls, Ohio.
Pacific Coast Steel Co., Rialto Bldg., San Francisco, Cal.
Phillips, F. R., & Sons Co., Pennsylvania Bldg., Philadelphia, Pa.
Phoenix Iron Co., The, 20 So. 15th St., Philadelphia, Pa.
Pittsburgh-Des Moines Steel Co., Curry Bldg., Pittsburgh, Pa.
Pollak Steel Co., The, Cincinnati, Ohio.
Republic Iron & Steel Co., Youngstown, Ohio.
Ryerson, Joseph T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Snead Architectural Iron Works, Louisville, Ky.
Standard Iron & Steel Co., New Haven, Conn.
Union Drawn Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Truscon Steel Co., Youngstown, Ohio.
Wallace Equipment Co., 11th St., S. W. & Hanford, Seattle, Wash.
Walsh & McGee Steel Co., 2 Rector St., New York City.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL (Tool)
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Reading, Pa.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Hawkridge Bros., Congress St., Boston, Mass.
Kidd Drawn Steel Co., Alliquippa, Pa.
Midvale Co., The, 4320 Wissahickon Ave., Philadelphia, Pa.
Ryerson, Jos. T., & Son, Inc., 16 and Rockwell Sts., Chicago, Ill.
Vanadium Alloys Steel Co., Latrobe, Pa.
Ziv Steel & Wire Co., 4423 W. Kinzie St., Chicago, Ill.

STEEL BUILDINGS—See BRIDGES, BUILDINGS and VIADUCTS

STEEL DOORS AND SHUTTERS
Kinnear Manufacturing Co., 818-868 Field Ave., Columbus, O.

STEEL FABRICATORS—See BRIDGES, BUILDINGS, VIADUCTS (Steel)

STEEL MILL SHOVELS
Wood Shovel & Tool Co., Piqua, O.

STEEL PLATE CONSTRUCTION
Blaw-Knox Co. 602 Farmers Bank Bldg., Pittsburgh, Pa.
Erie City Iron Works, Erie, Pa.
Hammond Iron Works, Warren, Pa.
Heltzel Steel Form & Iron Co., The, Warren, Ohio.
Hendrick Manufacturing Co., Carbondale, Pa.
Pennsylvania Engrg. Works, New Castle, Pa.
Petroleum Iron Works Co. of Ohio, Sharon, Pa.
Riter-Conley Co., Oliver Bldg., Pittsburgh, Pa.
Sotter Bros., Inc., Pottstown, Pa.
Steel Plate Products Co., Pottstown, Pa.

STEEL PLATES—See PLATES (Iron and Steel)

STEEL STAMPINGS—See STAMPINGS

STEEL STOOLS, CHAIRS, TABLES, TRUCKS, BENCH LEGS
Angle Steel Stool Co., Inc., The, Plainwell, Mich.

STEEL TUBING (Cold Drawn)
Babcock & Wilcox Tube Co., Beaver Falls, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Summerill Tubing Co., Bridgeport, Pa.

STENCIL CUTTING MACHINES
Bradley Stencil Machine Co., 3740 Forest Park Blvd., St. Louis, Mo.

STEPS (Ladder and Stair, Nonslipping)
Irving Iron Works, Long Island City, N. Y.

STEPS (Ladder, Car, Stair-Steel and Safety)
Irving Iron Works, Long Island City, N. Y.

STOKERS
Armstrong Mfg. Co., The, Liberty & Penn R. R., Springfield, Ohio.
Babcock & Wilcox Co., The, 85 Liberty St., New York.
Combustion Engineering Corp., 43 Broad St., New York City.
Hagan, Geo. J., Co., Chamber of Commerce Bldg., Pittsburgh, Pa.
Sanford Riley Stoker Co., Worcester, Mass.

STOOLS AND FACTORY EQUIPMENT (Steel)
Angle Steel Stool Co., Inc., The, Plainwell, Mich.
Cleveland Wire Spring Co., The, 1281 E. 38th St., Cleveland, O.

STRAIGHTENING MACHINERY
Logemann Brothers Co., 3120 Burleigh St., Milwaukee, Wis.
Shuster, The F. B., Co., New Haven, Conn.
Sutton-Abramsen Engrg. Co., Park Bldg., Pittsburgh, Pa.

STRIP MILLS (Hot or Cold)
Blake & Johnson Co., The, 185 N. Elm St., Waterbury, Conn.
Treadwell Engineering Co., Easton, Pa.

STRIP STEEL STRAIGHTENERS
Shuster, The F. B., & Co., New Haven, Conn.

STRIP STEEL (Hot and Cold Rolled)—See STEEL STRIP (Hot and Cold Rolled)

STRUCTURAL IRON AND STEEL—See STEEL (Structural)

SUBWAY GRATING
Irving Iron Works, Long Island City, N. Y.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., Cleveland, O.
New Jersey Zinc Sales Co., Front and Maiden Lane, New York City.

SWITCHES (Electric)
Electric Controller & Mfg. Co., Cleveland.

SWITCH STANDS
Bethlehem Steel Co., Bethlehem, Pa.

TANKS (Acid)
Hauser-Stander Tank Co., Cincinnati, O.

TANKS (Air, Gas, Gasoline, Oil and Water)
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.

TANKS (Acetylene)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

TANKS (Storage, Pressure, Riveted, Welded)
Air Tight Steel Tank Co., Pittsburgh, Pa.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Hammond Iron Works, Warren, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Curry Bldg., Pittsburgh, Pa.
Riter-Conley Co., Oliver Bldg., Pittsburgh, Pa.
Sotter Bros., Inc., Pottstown, Pa.
Steel Plate Products Co., Pottstown, Pa.
Wilfong, Millard F., Iron Works Co., 5195 Grays Ave., Philadelphia, Pa.

TANKS (Wooden, Acid and Pickling)
Hauser-Stander Tank Co., The, Cincinnati, O.

TAPPING MACHINES
Taylor-Wilson Mfg. Co., Thomson Ave., McKees Rocks, Pa.

TAPS AND DIES
Landis Machine Co., Waynesboro, Pa.

TERNE PLATE
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.

TESTING MACHINES (Pipe)
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.

TIE PLATES
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.

TIN PLATE
American Sheet & Tin Plate Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Mansfield Sheet & Tin Plate Co., Mansfield, Ohio.
Trumbull Steel Co., The, Warren, Ohio.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE MILL EQUIPMENT
Birdsboro Steel Fdy. & Machine Co., Birdsboro, Pa.
Lewis Foundry & Machine Co., Farmers Bank Bldg., Pittsburgh, Pa.

TITANIUM
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

TOOL BITS (High Speed)
Firth-Sterling Steel Co., McKeesport, Pa.

TOOLS
Cleveland Steel Tool Corp., The, 660 East 82nd St., Cleveland, O.

TOOLS (Pneumatic)
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway New York City.

TOOLS (Portable Electric)
Chicago Pneumatic Tool Co., 6 East 44th St., New York.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction Sales Co., 342 Madison Ave., New York City
Oxweld Acetylene Co., Newark, N. J.

TOWERS (Transmission)
American Bridge Co., 71 Broadway, New York City.
Blaw-Knox Co., 602 Farmers Bank Bldg., Pittsburgh, Pa.
Pacific Coast Steel Co., Rialto Bldg., San Francisco, Cal.

TRACK SPECIALTIES
Track Specialties Co., 4 Morris St., New York City.

TRAMRAILS
Cleveland Crane & Engineering Co., The, Wickliffe, O.

TRANSFORMERS (Speed)
Ganschow Co., Wm., 42 N. Morgan St., Chicago, Ill.

TREADS (Nonslipping)
Irving Iron Works, Long Island City, N. Y.

TREADS (Safety, Stair and Ladder)
Irving Iron Works, Long Island City, N. Y.

TROLLEYS
Armington Engineering Co., The, Euclid, O.
Cleveland Crane & Eng. Co., Wickliffe, O.
Milwaukee Electric Crane & Mfg. Co., Milwaukee, Wis.
Shepard Electric Crane & Hoist Co., 358 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

TRUCKS (Electric Lift)
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, O.

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Electric hoists in capacities to 10 tons—floor and cage control types.
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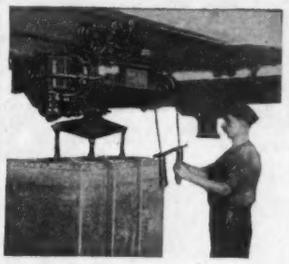

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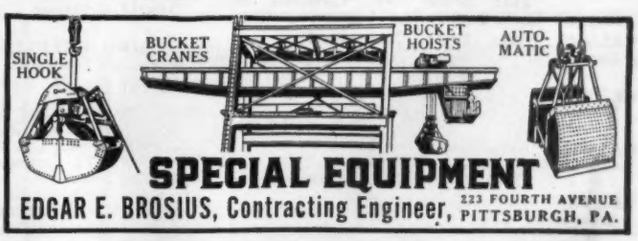

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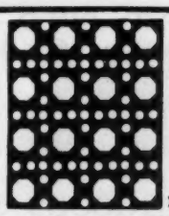

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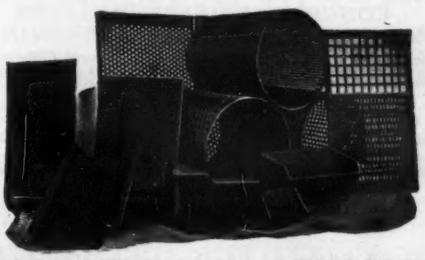

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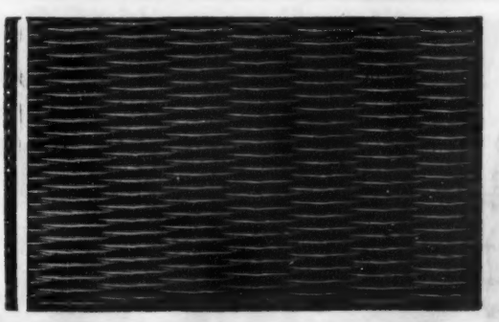

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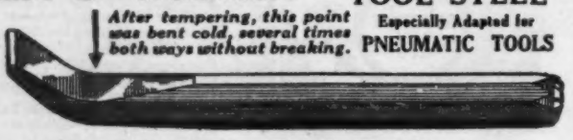
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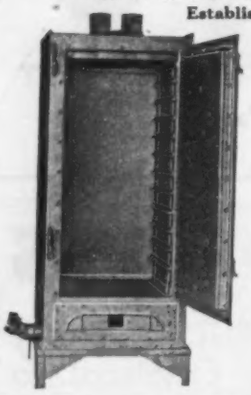

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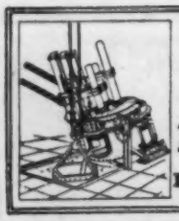

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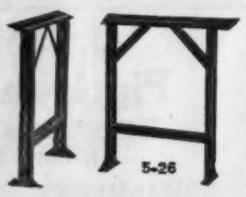

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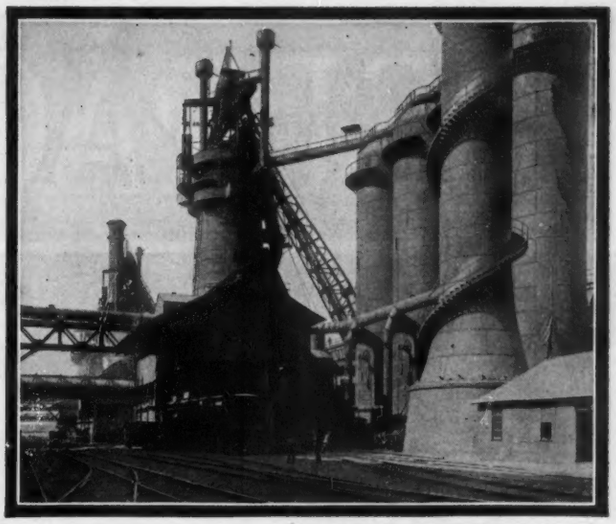

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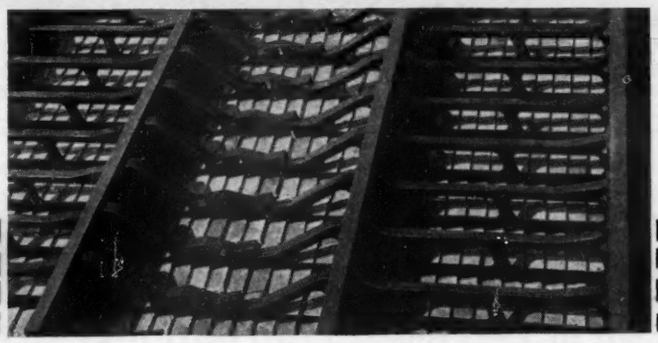

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* * *

The complete equipment of the Walker Webbing Co., Brockton, Mass., was to be sold at public auction Dec. 18 by G. L. & H. J. Gross. The list includes many textile machines and the usual tools of a mill machine shop.

* * *

Between 30 and 40 machine tools and miscellaneous small tools, dies, jigs, motors, etc., are being offered for sale by the Miles Machinery Co., 207 Bearinger building, Saginaw, Mich., which recently purchased the entire equipment of the Simplex Wire Wheel Co., Cadillac, Mich. The Simplex company was developing a wire wheel for automotive use but never started production. William L. Miles heads the Miles company, which deals in new and used machinery.

* * *

Electrical equipment, machinery, tools, scrap metals, paints, valves, screws, nuts, rivets, channels and tees, hexagon steel, hand tools, hardware, and many other classes of material will be offered at public auction Jan. 14 by the navy department at the Mare Island navy yard, Calif.

* * *

Miscellaneous equipment, including a varied list of iron and steel products, such as screws, nuts, bolts, rivets, wire, brass, steel, small tools, machinery, etc., will be offered for sale at public auction Jan. 7, by the navy department at Hampton Roads, Va. Gus Eichberg, Washington, is auctioneer.

* * *

Abandonment of manufacture of tractors by the U. S. Tractor & Machinery Co., Menasha, Wis., some time ago has been followed by disposition of the bulk of the machinery in the plant on Sixth street. The larger part has been purchased by the Miller Paper Stock Co. of the same city, which is a large dealer in used machinery as well as waste materials, scrap metals, etc. The shop buildings still remain in possession of the United States company, but the intention is to make disposition as soon as possible.

* * *

Sealed bids will be taken by the postoffice department until Jan. 5 by the purchasing agent of the Post Office department, Washington, D. C., on welding outfits, electric drills, boring bars, drill presses, etc.

Sales Calendar

Dec. 29—Carbon Steel Co., Thirty-second and Smallman streets, Pittsburgh, at public sale, by John F. Post & Sons, auctioneers.

Jan. 5—Post office department, Washington, will take sealed bids on equipment.

Jan. 7—Sale of navy department surplus, Hampton Roads, Va., by Gus Eichberg, Washington, auctioneer.

Jan. 14—Navy department surplus, Mare Island, Calif.

Germans See Locomotive Building Increase

Washington, Dec. 23.—The German locomotive industry has been dependent almost entirely on its export trade for orders during the past few years, according to a report to the Department of Commerce from E. W. Magnuson, Stuttgart. The German government, in an endeavor to balance its budget during the period of currency inflation, has been compelled for economic reasons to neglect more or less the upkeep of the railroads, which were operated at a loss during the greatest part of the depreciation period. No orders to speak of, therefore, have been received from the governmental railway administration, which organization is the chief inland buyer of locomotives. A book was created in Germany's exportation of locomotives in 1922 when Soviet Russia placed extensive orders for locomotives and tenders, but when these orders ceased to come in at the close of the year, the export business became dull and has remained inactive since.

Locomotive manufacturers, now expect, however, that soon after the Reich's railway bill has been carried by the Reichstag, orders again will be placed for replacement of the worn-out material and for extensive repairs. It is expected also that the locomotives which have been worn out beyond repair in the occupied area, will be replaced by new engines and that efforts will be made to restore the efficiency of the German railroads to the prewar standard.

Will Urge Metric System

Washington, Dec. 23.—Adoption of the metric system of weights and measures by the United States will be urged at the annual convention of the Metric association, which will be held here Dec. 29 and 30, with representatives of a number of the nations now employing the metric system in attendance. The address of welcome will be made by Capt. Hugh Miller, dean of the college of engineering, George Washington university. Dr. George K. Burgess, director of the bureau of standards, and Dr. Hazel E. Munsell, bureau of home economics, department of agriculture, will be among those to address the convention. The delegates will visit the bureau of standards on the afternoon of Dec. 29 following an "international luncheon."

The American Bosch Magneto Corp., Springfield, Mass., will enter the radio field in January through the introduction of a device for supplying current to radio sets without recourse to batteries.

Used AND Rebuilt Equipment

For Machine Shops, Foundries, Iron and Steel Works, Mines, Railroads and Metal-Working Plants Generally

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PUBLIC SALE

THE LIQUIDATING COMMITTEE of the

Carbon Steel Co., Foot of 32nd. & Smallman Sts. Pittsburgh, Pa.

will place on Sale

Monday, December 29, 1924 at 10:00 A. M.

ON THE PREMISES

About 7½ Acres of Real Estate and all Equipment and Buildings

The sale includes a 32-inch motor driven jobbing sheet mill, 100 D. C. motors, 3 to 100 H. P., electric furnaces, railroad tracks, scales, wagon scales, locomotives, handcars, copper cables, locomotive steam cranes, overhead trolleys, horizontal twin cylinder engines, elevators, twenty-ton cranes, self supporting stacks, hydraulic shears, hydraulic and steam pumps, Johnson lathes, and hundreds of other items of machinery to be found in the modern steel plant. The right will be reserved to reject any and all bids.

The above real estate will be sold as a whole or in part. This property has Pennsylvania and Baltimore & Ohio railroad sidings. Allegheny River frontage.

Also ninety acres more or less situated opposite the city of Kittanning, Pa. Very adaptable for manufacturing. River and railroad frontage.

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Carbon Steel Company

Pittsburgh, Pa.

John F. Post & Sons
Auctioneers

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Machinery Bargains

AIR COMPRESSOR, 600 ft. Bury.
BORING MILL, "Universal" horiz., 3" bar.
BRAKE, 6' x ¼" Chicago.
HAMMER, Bradley 300 lb.
HAMMERS, air chipping & Riveting.
LATHE, 60" x 18' New Haven.
PLANER, 30 x 30 x 8 Cleveland openside.
TURRET LATHES, 3 Warner Swasey 2A.
PUNCH, Massillon 36" x 1¼", arch'l.
SHAPERS, 16" and 20" Ohio, 95% new.
WELDER, Toledo spot, ⅛".

Money Back Guarantee

Miles Machinery Co.
Saginaw, Mich.

Desirable Punch Presses
For Immediate Delivery

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1—95C Toledo D.C. Geared-Trimming—4" stroke.
1—No. 204-A Toledo D.C. 2½" stroke, open belt.
1—No. 206-C Toledo B.G., D.C. Overhanging, 2½" stroke.
1—No. 55 Toledo S. S. Trimming.
1—No. 54 Toledo S. S. Trimming.
1—Type SA-182-500-ton Ferracute Press.
1—Perkins D.A., S.S. Drawing.
1—Perkins Toggle Press—7¾" and 13" stroke, 125 tons capacity.
1—Perkins Bending Press—3" stroke, 120" between housings.

RIVERSIDE MACHINERY DEPOT
Detroit, Michigan

BORING MILLS

54" Bullard, "Maximill," M.D. (near new)
52 and 42" King, suitable for belt or motor
30" Gisholt (used 6 months)
72" Betts, 2 heads, cone drive (70%)
No. 31 Lucas Horiz., 3" bar, Q.C.G.
No. 2 Rockford Horiz., 2" bar

MISCELLANEOUS

Bulldozers, Nos. 6, 7 and 8, Williams-White
Keyseater, No. 1 Baker, cap. 12" x 1½"
Lathe, 30" x 14' Lodge & Shipley, Q.C.G., T.A.
Lathe, 36" x 18' Am. GH., Single Pulley
Miller, No. 3-B Milwaukee: 3-H LeBlond
Pipe Machine, 6" Williams; 8" Saunders
Presses, No. 75½ Bliss, tie rod, 6" stroke, M.D.
Pump, Cameron, 4650 G.P.M., 97' head with 150 H.P. motor 3/60/440 (New)

Partial List

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SHOP EQUIPMENT

1—No. 17 Bartlett Greenard Arbor press, 25-ton capacity, distance between housings 36".

1—Newbold plate clamp 78" wide.

1—General Electric Arc Welding set, MG-3, 500 ampere, complete and ready for operation. Mounted on two 36" gauge cars.

1—36"x72" pipe bending and straightening table with holes.

1—60"x72" Newbold bending & straightening table with holes 6" centers.

2—American Metal Works Formers, special for box linings.

10—Portable 2-shelf 24"x20" Tool stand with 1-drawer 16"x7". Height overall 31½".

13—Clark Double Kerosene Oil burners, complete. Mfg. by Clark Novelty Co.

1—Champion Samson No. 1 tire bender, hand and power driven, with tight and loose pulley. Mfg. by Champion Blower & Forge Co.

1—200 ft. Acetylene gas generator, 200 lb. Navy Type Generator No. 12912—Motor No. 11123.

1—Tie Straightener Machine.

2—Cross Oil Filters. Mfg. by Burt Mfg. Co. No. 4 Filtering Capacity 50 to 60 gals. per day (24 hrs.)

1—No. 11 Boston wire sticher for stitching wire mesh. American Type Founders Co.

1—C C Hare's Patent four-leaf cornice brake, old No. 96, new No. 685 capacity 318 gauge iron and lighter, length 98". Mfg. by Peck, Stew & Wilcox Co.

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A number of unusual and desirable machine tools selected at random from our tremendous stock; available for immediate shipment and guaranteed to be in first-class operative condition.

1—Becker Model D-1 Die Sinker & Vertical Milling Machine.
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1—1500-lb. Toledo Friction Roll Board Drop Hammer.
1—7500-lb. Chambersburg Steam Drop Hammer.
1—1500-lb. Chambersburg Steam Drop Hammer.
1—16" x 6' Bed Hendy Tool Room Lathe with Taper Att. and Pan Bed.
1—No. 2-A Warner & Swasey Single Pulley Drive Hand Screw Machine.
1—1¼" Model "B" Cleveland Automatic with Magazine Feed.

RIVERSIDE MACHINERY DEPOT
Detroit, Michigan

REAL BARGAINS

1—3¼" Single Spindle Gridley Automatic Serial No. 2105.
1—Semi-Automatic Edging Lathe (built by the Waterbury-Farrel Foundry & Machine Co.), Serial No. 63177.

Machines are complete with standard equipment, had very little use and are guaranteed to be in first class condition.

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Shear Splitting, No. 134 Lennox.
Shear Square, No. 416-J 10' Toledo, 16 ga. under drive Flywheel type.
Screw Machine, 2¼" x 7" Gridley Multi-sp. Auto, Model F.
Turret Lathes, 18" and 26" Libby.
Lathe, 8" x 60" Fitchburg Geared Head, low swing production, NEW.
Lathe, 36" x 14' Springfield Heavy Pattern, 5 st. cone, S. B. gd.
Planer Plate, No. 3-16' Niles.
Drill Radial, 4' Fosdick Pl. late type.
Grinder Surface, No. 3 Abrasive.
Bending Rolls, 110" Hendl. & Wh. Cap. 16 ga., 95% new.

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Chicago Compressors, 130,690 cu. ft.
Niles 36", 51", 90", 10' Boring Mills.
Dreses 4', Pond 6½ & 8' Radial Drills.
B. & S. No. 13 Automatic Gear Cutter.
Landis No. 3 Universal Grinder 12" x 42".
Bradley 75 lb. & 100 lb. Upright Strap Hammers.
J. & L. 2½" x 24", 3" x 36" Flat Turret Lathes.
Cincinnati Nos. 2 & 3S Universal Millers.
Toledo No. 52 Geared Arch Press.
L. & A. Dbl. End Punch & Shear, Nos. 6-7.
Gould-Eberhardt 16", 20" B.G. Shapers.
Lewis and Carlin Alligator Shear, 1¾-1¾".
Niles 15" Slotter, 30" rotary table.
Acme ¾" Steel Bed Upsetter.

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MACHINE COMPANY
Pittsburgh, Pa.

Boring Mills, 42" King & Bullard, MD.
Boring Mill, 60" Bullard Vert. 2 heads, MD.
Boring Mill, 10' Niles, 2 heads.
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No. 5-C Becker Vertical Miller, with rotary.
24" Betts Rotary Planer, belt drive.
No. 59 Toledo Press, 12" stroke.
No. 79½ Bliss Tie Rod Press, double geared.
L. & A. Horiz. Punch, cap. 1" thru 1", 12" throat.
Radial Drill, 5' Prentice, S.P.D., gear box.
20" Steptoe Shaper, B.G. Crank.
Angle Shear, 6" x 6" x ¾", on turntable.
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2", 3", 4" and 5" Upsetting Machines.

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79" PUTNAM Driving Wheel, belt driven.
60" x 21' SELLERS, 14' centers.
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36" x 14' BRIDGEFORD Geared Head Lathe.
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24" STOCKBRIDGE Heavy Duty Shaper.
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3"-4"-5" Horizontal Adjustable, Knee Type.

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5' BAUSH Radial, Heavy Duty, Belt Drive (2).
5' DRESES Radials, Motor Drive, 10 H.P., A.C. motor, latest type (2).
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Engine	*Generator*
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10¼" Bore	Volts—240
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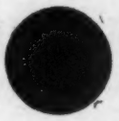

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2—500 h. p. Keeler boilers with self supporting stacks. Wetzel stokers, and all accessories. 160 lbs. pressure.

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Old Hickory, Tennessee

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1601 Arrott Building Pittsburgh, Pa.

Rails and Mine Cars

Rails—all Sections—New and Relaying. Also Frogs and Switches. Bridge Girders and I-Beams, all sizes. New Mine Cars of Most all gauges in stock for immediate shipment.

M. K. FRANK
Union Trust Bldg., Pittsburgh, Pa.
New York Office: 15 Park Row Building

LISTEN!

Opportunity knocks — but you've got to meet her at the door.

Watch these pages!

609

Tell your Story to Thousands with a Classified Advertisement

BY INSERTING an advertisement on this or one of the accompanying pages, you can tell thousands about the used planers or lathes you have for sale; of your need of a good second-hand miller; that you are seeking a salesman who can produce the goods.

Classified advertisements open the way to opportunities.
Use them!

639

Opportunities

Advertisements in this section are referred to by those seeking plants and plant sites, miscellaneous semi-finished and finished raw materials; by those who desire agencies.

Advertising Rates: 1" One Time $5.00; 2" One Time $9.50; 3" One Time $14.00; 4" One Time $18.00

FOR SALE

BAR and SHEET MILL

At very attractive figure. Located in Pittsburgh District. Desirable Labor Market. Located on two Railroads. Can be operated on Open Shop basis if desired. Ready for immediate operation. Address Box 371, IRON TRADE REVIEW, Cleveland.

For Sale

STEEL FRAME BLDGS.

Monitor Type

75 x 200 and 90 x 200

Good condition. Suitable for manufacturing, machine shop or foundry. Address Box 376, IRON TRADE REVIEW. Cleveland.

GOING BUSINESS WANTED

Preferably machinery for use in steel mills or railroads. Would be interested in the development of patents pertaining to this class of machinery, where a future can be demonstrated. Address Box 354, IRON TRADE REVIEW, Cleveland.

WANTED TO BUY USED AIR COMPRESSORS

Belt Driven, two Stage, 100 lbs. pressure. Sizes 500 to 1200 cu. ft. Standard Makes.

Landreth Machinery Co.
Joplin, Mo.

BARS WANTED

High carbon or alloy steel bars 9/16" to 1" diameter. Can use rusty stock and short lengths. Address Box 366, IRON TRADE REVIEW, Cleveland.

PLANTS
Bought and Dismantled
IRON and STEEL SCRAP

HENRY POTTS & CO.
1610 Bankers Trust Building
Philadelphia

RESOURCEFUL
and
RESULTFUL

Many advertisers have written us telling of the quick action received through the classified-ad service of

IRON TRADE REVIEW

Numerous big deals, resulting in the buying and selling of metal-working plants, have been consummated, in which a small classified-ad in the Opportunities Section played the leading part.

Our aim is to give real service in putting your proposition before those interested, and consequently, to give you conclusive results.

If you are not one of the believers, let us convince you.

648

SPECIALISTS IN

FACTORIES

FOR SALE OR LEASE

Have professional engineers with extensive plant experience who can therefore better appreciate your requirements, aid you in locating a suitable factory.

TECHNICAL SERVICE COMPANY
Woolworth Bldg., N. Y. C. Whitehall 5690

SPACE FOR LEASE

We have just purchased a new modern manufacturing plant and desire to lease 16,000 sq. ft. of ground floor space with light, heat and power furnished. Excellent opportunity to acquire new space on reasonable terms. Address P. O. Box 454, Clinton, Iowa.

WANTED
WELDING OUTFIT

Gasoline engine driven electric welding outfit. Price and details. P. O. Box 1232, Boston, Mass.

Let us make your wants known on this page.

Employment

POSITIONS OFFERED Minimum ad., 50 words, $3.00 Additional words, $.06 each

When a box address is desired count seven words in addition to your copy

POSITIONS WANTED Minimum ad., 30 words, $1.00 Additional words, $.03

Positions Offered

WE HAVE SOME EXCELLENT TERRItory open for salesmen with a push whose earning capacities are at least $5,000 annually. Our "PERFECT" Pulley Covering has a widespread appeal among industries of every description because it is a positive preventive of belt slippage and its attendant evils. Used and endorsed by such eminent concerns as the Dodge Manufacturing Company of Mishawaka, Ind.; Link Belt Company; Fairbanks, Morse Company; American Steel & Wire Company and 10,000 other industries. Under our plan we virtually put you in business for yourself and if you can qualify, an earning possibility of at least $5,000 annually awaits you. Address: Kingsley Manufacturing Company, Indianapolis, Ind.

THE BEST WAY TO GET A GOOD position in drafting or engineering is to file application direct with some of our clients who are depending on us to get competent and experienced applicants for their vacant positions. Send stamp for blank and list of vacant positions. The Cleveland Engineering Agency Co., Rose building, Cleveland, O.

SALARIED POSITIONS $2,500 TO $25,000 upward; executive, technical, administrative, engineering, manufacturing, professional, managing, financial, etc., all lines. If you are qualified and receptive to tentative offers for a new connection, you are invited to communicate in strict confidence with the undesigned, who will conduct preliminary negotiations for such positions. A method is provided through which you may receive overtures in confidence, without jeopardizing present connections, and in a manner conforming strictly to professional ethics. Send name and address only; preliminary particulars will be sent without obligating or compromising you in any way. R. W. Bixby, Inc., 416 Lockwood building, Buffalo, N. Y.

SUPERINTENDENTS, EXECUTIVES, ENGINEERS, $3000-$25,000, will find our individual confidential service an effective, dignified medium to make desired connections. Personally conducted by MR. JACOB PENN, the eminent employment authority, known to leading business men throughout America. Not employment agency. Jacob Penn, Inc., 305 Broadway, New York.

GENERAL ENGINEERING AGENCY, Pittsburgh, Pa., require for transcontinental miscellaneous connections: Mechanical Superintendents under $6,000; Production Supervisors, Clerks; Plant Engineers, Senior-Juniors; Chief Mechanical, Structural, Industrial Draftsmen; Foundry Estimators, Machine-Tool designers; Factory Cost Engineers; Master Mechanics; Chemists; Instructors. Commission 3%.

ENGINEER FAMILIAR WITH DEsign and construction of railroad wrecking cranes. Applications are desired only from men who have had several years of experience. In answering please write fully, outlining experiences and training in detail. Address Box 363, IRON TRADE REVIEW, Cleveland.

Positions Offered

MANUFACTURERS' REPRESENTAtives to sell drop forgings, gray iron castings, also special contract manufacturing work, for a large Manufacturing Company. Address Box 361, IRON TRADE REVIEW, Cleveland.

Positions Wanted

INDUSTRIAL POSITION
IN PITTSBURGH

Sought by a Young Man
at Present Employed
in Government Technical Service

Wishes to become permanently connected with a well established firm in which a responsible position may be earned by training himself to meet employer's needs.

Experience: Two years estimating for two well known manufacturers of heavy mill machinery and fabricated structural steel. More than four years in technical service of U. S Government, on fuel and furnace tests, computation of heat accounts in boiler and industrial furnace practice, business administration of private railroad car in field work (including correspondence, purchases, accounts, transportation, etc.), surveys of industrial plants and preparation of reports.

Salary desired: $250 per month

Age: Twenty-eight years.

Address Box 353,
IRON TRADE REVIEW,
Cleveland.

PLANT MANAGER OR SUPERINTENDENT CAPABLE EXECUTIVE WITH THOROUGH KNOWLEDGE OF COLD UPSET SCREW PROCESS. TECHNICAL EDUCATION AND THOROUGH PRACTICAL KNOWLEDGE OF TOOLING, ROUTING COST AND ENTIRE PRODUCTION. REPLIES HELD IN CONFIDENCE. AGE THIRTY. AT PRESENT EMPLOYED BUT AVAILABLE IN REASONABLE TIME. ADDRESS BOX 364, IRON TRADE REVIEW, CLEVELAND.

MECHANICAL ENGINEER, MAINTENance, boilers, power equipment, fuels, furnaces, testing and modernizing of plants. 17 years experience in industrial engineering. Technical graduate; location Chicago. Address Box 374, IRON TRADE REVIEW, Cleveland.

Positions Wanted

YOUNG MAN WITH 8 YEARS EXPERIence, cost, production, mechanical, desires position with manufacturing concern, preferably as assistant to executive. First class references. Address Box 375, IRON TRADE REVIEW, Cleveland.

EXECUTIVE ENGINEER WISHES NEW CONNECTION. THOROUGH PRACTICAL KNOWLEDGE OF MODERN MANUFACTURING METHODS AS WELL AS MAINTENANCE, ROUTING PRODUCTION AND COST. EXCELLENT RECORD. CAN HANDLE MEN TO GET BEST RESULTS. 30 YEARS OF AGE. AT PRESENT EMPLOYED. BEST REFERENCES. ADDRESS BOX 365, IRON TRADE REVIEW, CLEVELAND.

PRODUCTION JOB WANTED
Young man, five years in chemical and metallurgical investigations and plant experience desires opportunity in manufacturing plant. Address Box 373, IRON TRADE REVIEW, Cleveland.

A HIGH GRADE METALLURGIST AND roll maker desires a position with a reliable company which will appreciate honest effort and service. He is experienced in the manufacture of iron, steel, special steel castings and rolls of all kinds; also heat treatments. Is capable of supervising production and obtaining quality and is acquainted with the trade, having been successful in the selling end of the business. An American of good character, and a producer. Address Box 368, IRON TRADE REVIEW, Cleveland.

SALES OPENING DESIRED BY CHEMical and metallurgical engineer, consulting and practical experience. Heat treating, physical testing and metallographic experience as well. Age 29. Address Box 372, IRON TRADE REVIEW, Cleveland.

METALLURGIST WITH EIGHTEEN months practical experience in charge of metallurgical operations in electric steel foundry; thoroughly acquainted with electric acid steel melting and refining. College education; 26 years old; white; married. Now employed but for good and sufficient reasons desires a change. Best of references. Interested in getting connected with some reliable firm in any position offering chances for advancement. Inquiries solicited. Address Box 367, IRON TRADE REVIEW, Cleveland.

MALLEABLE FOUNDRY SUPERINtendent, now employed desires to make a change by January 1st. Can produce Automobile and Railway Castings on a quality and quantity basis at a minimum cost. Have specialized on production work. Address Box 370, IRON TRADE REVIEW, Cleveland.

Fill-in and Contract Work

Buyers refer to the cards in this section when they have orders to place for castings, stampings, forgings, screw machine products, patterns, special machinery, jigs, tools, dies, etc.

Rates per Insertion on Yearly Basis 1"—$3.75 : : 2"—$7.00 : : 3"—$10.00 Rates for Other Spaces Furnished on Request

"SCRAP METALS"
A complete, authoritative handbook on scrap iron, steel and metals.
Price $3.00 a copy
THE PENTON PUBLISHING COMPANY
Penton Bldg. Cleveland, O. 602

FORGINGS
Upset and Hammered
Permit us to figure on your requirements of forgings.
THE WHEELING AXLE CO.
Wheeling, W. Va.

Gray Iron Castings
Inquiries for Prices Appreciated and promptly answered
LAURELTON FOUNDRY CO.
Laurelton, Pa.

MACHINE WORK WANTED
Medium and Heavy
THE LONG & ALLSTATTER CO.
Hamilton, Ohio
POWER PUNCHES AND SHEARS

HOT DIP GALVANIZING
We have the largest hot dip job galvanizing plant and kettles in the United States.
We have the most modern equipment to do first class galvanizing at lowest prices. Galvanized Products Furnished.
Prime Western Zinc used exclusively
Send us your inquiries
Joseph P. Cattie & Brothers
Gaul and Letterly Streets
PHILADELPHIA

HIGHEST QUALITY
GRAY IRON CASTINGS
Drop Forgings—Dies—Wood and Metal Patterns
Production and contract work solicited.
Send us blue prints for estimates.
KENTUCKY WAGON MFG.CO.
Louisville, Kentucky

SPECIAL MACHINERY
built in our well equipped
DAYLIGHT MACHINE SHOP
Special gasoline and steam motors, etc.
Let us figure with you.
LAMMERT & MANN COMPANY
Wood and Walnut Sts., Chicago, Ill.

We are interested in securing
A GOOD LINE OF EQUIPMENT TO MANUFACTURE
We have one of the best equipped plants in the country for handling medium heavy work. All new and up-to-date equipment served by traveling cranes. Complete pattern shop, gray iron foundry, machine shop and steel fabricating shop.
We solicit Medium Heavy Work in Fabricated Steel, Steel Tanks, Engines, Pumps and Special Machinery of any kind.
THE SMITH GAS ENGINEERING CO.
Dayton, Ohio

USE OUR PLANT!
We have a completely equipped plant, centrally located, which is very suitable for the construction and assembling of medium heavy work of any nature. Electric crane equipment throughout the plant. Pattern shop, foundry for making gray iron, semi-steel or bronze castings up to 10 tons in size, machine shop and steel fabricating shop, all at your disposal.
Dictate a letter to us now, telling of your requirements and we will be at your service immediately.
MOLOCH COMPANY
Kaukauna, Wisconsin

MISCELLANEOUS EQUIPMENT
which may be taking up valuable space in your plant without being made use of, can be disposed of through
IRON TRADE REVIEW.
CASH IN
646

SPECIAL PARTS AND MACHINERY
built to your specifications in modern plant. All kinds of machine work solicited.
Mail blue prints for quotations.
Central Steel Products Company
Clinton, Iowa

CONTRACT WORK
Machine shop, tool room and assembly facilities. Jobbing or quantity. Accuracy guaranteed.
Mail Blue prints for quotations.
DAVENPORT MFG. CO., INC.
Dept. 62 Davenport, Iowa

FORTY-SIX YEARS
have elapsed since we first produced
PRESSED METAL PARTS
Economical—Light—Clean
Peter Gray & Sons Company
Cambridge, Mass.
"Started in 1878 and Growing Yet"

In need of a skilled man?—Use a Help Wanted advertisement

WHERE-TO-BUY CASTINGS

ALABAMA

INTERSTATE FOUNDRY CO., Anniston. High grade soft gray iron. Present daily production fifty tons. Machine and pattern shop.

ARKANSAS

STANDARD BRAKE SHOE & FOUNDRY CO., Pine Bluff. High quality steel castings by electric process.

CONNECTICUT

THE SESSIONS FOUNDRY CO., INC., Bristol. Gray iron from smallest to thirty tons. Pattern and machine shop.

I. S. SPENCER'S SONS, INC., Guilford. Gray iron, brass and bronze castings, machined, japanned or plated. Screw machine products.

PRATT & WHITNEY CO., Hartford. High tensile, close grain gray iron a specialty to 10 tons. Molding machine, pattern, machine shop facilities.

THE BRADLEY & HUBBARD MFG. CO., Meriden. Gray iron, bronze, brass and aluminum. Fine quality. Machined and finished as desired.

NELSECO FOUNDRY, New London. Gray iron; 30% steel, 5 lbs. to 10 tons. Superior steel castings up to 2,000 lbs. Machine work.

THE WATERBURY CASTINGS CO., Waterbury. Gray iron and semi-steel machinery castings from 5 lbs. to 10 tons.

ILLINOIS

E. A. BAUMBACH MFG. CO., Chicago, 1812 S. Kilbourn Ave. Everything in die shoe castings.

NUGENT STEEL CASTINGS CO., Chicago. High quality steel castings and special alloy steels from electric furnaces.

K. S. HAMILTON, Chicago, 14 W. Washington Blvd. If you want quality gray iron, malleable, steel or non-ferrous castings, get my quotations.

A. PLAMONDON MFG. CO., Chicago, 5301 South Western Blvd. Gray iron castings. Machine and pattern shop.

UNION STOCK YARDS CASTING CO., Chicago, Morgan St. & 49th Place. High grade gray iron castings, medium weight. Brass and aluminum.

THE WESTERN FOUNDRY CO., Chicago. 36th St. and Kedzie Ave. Light gray iron and aluminum castings. Well equipped for production work.

STERLING STEEL CO., East St. Louis. Small electric steel castings of quality. Special carbons and alloys.

HAVANA MANUFACTURING CO., Havana. Gray iron and semi-steel castings, rough or finished. Machine and pattern shop.

CHUSE ENGINE & MFG. CO., Mattoon. Gray iron and semi-steel castings up to 40,000 lbs. Machine and pattern shop.

THE MOLINE FOUNDRY CO., Moline. Gray iron castings from one ounce to two tons. Machine and pattern shop.

WILLIAMS, WHITE & CO., Moline. Gray iron and semi-steel from 5,000 to 70,000 lbs. a specialty. Bench, light molding. Pattern and machine shop.

KNOWLES FOUNDRY & MACHINE CO., Ottawa. Gray iron and alloy castings. Machine and pattern shops.

ILLINOIS FOUNDRY CO., Springfield. Light and medium gray iron and semi-steel castings. Pattern shop.

STERLING FOUNDRY CO., Sterling. Light to medium heavy gray iron castings. Building specialties.

INDIANA

ALEXANDRIA METAL PRODUCTS CO., Alexandria. Brass, bronze, copper and aluminum castings and bushings. Electro melt process.

BERTSCH & CO., Cambridge City. 500 to 40,000 lbs. gray iron or semi-steel. Pattern work and machine shop.

THE MAL-GRA CO., Cambridge City. Manufacturers of highest grade malleable iron.

HUBBARD STEEL FOUNDRY CO., East Chicago. Steel castings up to 100,000 lbs., sand iron and chilled iron rolls.

WM. F. HARTIG PLOW CO., Evansville. Gray iron castings. Heavy floor and bench work, gas burners, water fronts, ells and bowls a specialty.

INDIANA

VULCAN FOUNDRY, Evansville. Light and medium, soft or chilled gray iron castings. Quantity production. Well equipped pattern and mach. shops.

RINEBOLT FOUNDRY CO., Huntington. Guaranteed brass, bronze, copper and aluminum castings. Specialize in piano pedals and supplies.

CHANDLER & TAYLOR CO., Indianapolis. Gray iron and semi-steel castings up to 25,000 lbs. Sand blast cleaning. Machine and pattern shop.

MARION MACHINE, FOUNDRY & SUPPLY CO., Marion. Gray iron, semi-steel up to 20,000 lbs. Building specialties; pattern and machine work.

MUNCIE MALLEABLE FOUNDRY CO., Muncie. Malleable iron castings for all purposes.

ALUMINUM FOUNDRY CO., South Bend. Production work in aluminum castings only.

IOWA

MURRAY IRON WORKS CO., Burlington. Heavy gray iron castings. Machine, pattern shop, steel plate work.

DAVENPORT MACHINE & FOUNDRY CO., Davenport. Heavy gray iron and semi-steel to ten tons. Mfgrs. of "Davenport" Molding Machines.

DES MOINES FOUNDRY & MACHINE CO., Des Moines. Gray iron, light and heavy, 50 tons per day. Brass, aluminum. Pattern, machine shop.

NEWTON FOUNDRY CO., Newton. Modern jobbing plant; light or medium gray iron and aluminum castings a specialty. Best of quality and service.

OTTUMWA IRON WORKS, Ottumwa. Gray iron castings, medium and heavy; machine and pattern shop.

KANSAS

WESTERN IRON & FOUNDRY CO., Wichita. Gray iron castings; machine and pattern shop; structural steel and plate work.

KENTUCKY

W. C. HEIMBUECHER & CO., Louisville. Malleable iron and electric steel castings. Machine shop. Wood and metal patterns.

VOGT BROTHERS MFG. CO., Louisville, 1402 West Main St. Gray iron and semi-steel castings, all weights. Pattern and machine shop.

OWENSBORO FOUNDRY CO., INC., Owensboro. General line of foundry work. Gray iron castings, machine work and machine tool castings.

MARYLAND

AMERICAN FDY. & MFG. CO., Frederick. Gray iron and semi-steel castings, 1 oz. to 10,000 lbs. Machining, galvanizing, engineering.

MASSACHUSETTS

GOLDING MFG. CO., Franklin. Gray iron, one ounce to one ton. Modern production equipment. Pattern and machine shop.

ELECTRIC STEEL PRODUCTS CO., Turners Falls. Electric steel castings up to 200 lbs.

MICHIGAN

ALPENA INDUSTRIAL WORKS, Alpena. Gray iron castings, 2,000 lbs. or less. Pattern shop and machine shop well equipped.

BENTON HARBOR MALLEABLE FOUNDRY CO., Benton Harbor. Reliable malleable castings plain or machined, to blue print.

RIVERSIDE FOUNDRY & GALVANIZING CO., Kalamazoo. Medium and light weight high grade gray iron. Also hot dipped galvanized castings.

LAKE SHORE ENGINE WORKS, Marquette. Gray iron castings up to fifteen tons. Pattern shop and machine shop.

ENTERPRISE BRASS WORKS, Muskegon. Bronze and aluminum castings. Plumbers brass goods.

LITTLE BROS. FOUNDRY CO., Port Huron. Small gray iron castings; production quantities; general machinery; up to one ton.

AUTO SPECIALTIES MFG. CO., St. Joseph. Highest grade malleable castings, either plain or machined, and finished to blue print.

FAY FOUNDRY CO., St. Joseph. High grade charcoal iron machinery castings.

MINNESOTA

MINNEAPOLIS STEEL & MACHINERY CO., Minneapolis. Quality gray iron castings; pattern, machine, metallurgical facilities.

TWIN CITY FORGE & FOUNDRY CO., Stillwater. Electric steel, to 6,000 lbs. for trucks, tractors, locomotives, mining and contractors' equipment.

MISSOURI

RAPID BRASS FOUNDRY, Kansas City. Anything cast in brass, bronze or aluminum alloys. Snappy service, perfect quality, priced right.

A. GILBERT & SONS BRASS FOUNDRY CO., St. Louis. Castings in brass, bronze and aluminum. Patterns, finishing, babbitt metal solder.

LIBERTY FOUNDRY CO., St. Louis, 7600 Vulcan St. Gray iron castings. Warm air furnaces. 75 tons daily capacity.

NEBRASKA

YORK FOUNDRY & ENGINE WORKS, York. Gray iron castings. Machine shop and sheet metal shop.

NEW JERSEY

LUTZ CO., INC., Camden. Gray iron. Unusua pattern-making and machine shop service. Contract for finished product. Specialize in jigs and fixtures.

BARNETT FOUNDRY & MACHINE CO., Irvington (Newark), 536 Lyons Ave. Light and heavy gray iron and semi-steel. Machine work.

PHOENIX BRASS FOUNDRY, Irvington (Newark). Production castings, brass, composition and aluminum. Modern equipment; machine shop.

GEORGE KROUSE, Jersey City, 150 Morgan St. Brass and bronze castings, 1 lb. to 4,000 lbs. Aluminum, all sizes and weights. Fair prices.

SNEAD & CO., Jersey City. Gray iron; quantity production. Patterns; machining. Specialists for fine detail, accuracy, equipping for low cost.

RIVERSIDE STEEL CASTING CO., Newark. Acid open hearth castings up to 10,000 pounds.

NEW BRUNSWICK IRON WORKS, New Brunswick. Soft gray iron castings a specialty. Machining and boiler work.

SCHANTZ & ECKERT CO., Perth Amboy. Gray iron, semi-steel, brass and aluminum. Marine work a specialty.

McFARLAND FOUNDRY & MACHINE CO., INC., Trenton. Soft gray iron up to 3,000 lbs. each. Hard white iron for resisting wear.

NEW YORK

P. E. KENNEHAN'S SON & CO., Brasher Falls. Medium gray iron castings, rough or machined.

THOMAS PAULSON & SON, INC., Brooklyn. "Hecla" anti-friction bronze. Aluminum, composition and bronze castings for every purpose.

THE BRONZO ALUMINA CORP., Buffalo. Production aluminum castings made in permanent moulds. Machine shop; finishing department.

FARRAR & TREFTS, INC., Buffalo, 67 Perry St. Gray iron, 1 lb. to 50 tons. Semi-steel, chemical and chilled castings. Manholes and grates.

OTIS ELEVATOR CO., Buffalo. Electrically made and annealed cast steel, ¼ to 10,000 lbs. Hardening pots and valves from special metal.

CHEMUNG FOUNDRY CORP., Elmira. Dependable gray iron castings; analyzed daily to insure strong, soft metal. Modern molding machines.

ALUMINUM & BRASS CO., Lockport. Brass bronze, aluminum; cap. 20 tons daily. Machine hop; quantity production; pattern work.

A. L. SWETT IRON WORKS, Medina. Plumbers specialties, street castings and general gray iron castings. Machine work. Specialties.

CHAS. CORY & SON., INC., New York, 187 Varick St., Brass, bronze, aluminum, aluminum-silicon. Pattern and machine work.

FRONTIER BRONZE CORP., Niagara Falls. Titanium aluminum, bronze, copper, aluminum, brass castings. Bronze bushings in stock.

NAYLOR BROS., Peekskill. Gray iron up to 4 tons. Machine and pattern shop. Pulley castings and hangers. Daily boat service to New York City

WHERE-TO-BUY CASTINGS

NEW YORK

ADAMS FOUNDRY, Rome. Gray iron and semi-steel, 1 lb. to 3 tons. Wooden patterns. Machine shop.

E. R. CALDWELL & SON BRASS CO., INC., Syracuse. Brass, aluminum, bronze, bearing alloy castings. Pattern and machine shop.

SYRACUSE CHILLED PLOW CO., INC., Syracuse. Chilled iron castings of superior quality, unexcelled for hardness, smoothness and strength.

JAMES HOWDEN & CO. OF AMERICA, INC., Wellsville. Gray iron to 15 tons. Medium, small, Machine molding. Wood, metal patterns. Machining.

OHIO

THE AKRON BRONZE & ALUMINUM CASTING CO., Akron. Bronze, aluminum and pure copper castings. Specialists in hot mill brasses.

THE MACHINED STEEL CASTING CO., Alliance. Acid open hearth steel castings, 1 lb. to 100,000 lbs. each. Castings machined if desired.

THE ASHLAND MALLEABLE CO., Ashland. High grade Malleable iron castings for automobile, railroad and general use.

THE JOSEPH DICK MFG. CO., Canton. Gray iron and semi-steel castings of all kinds. Soft gray iron a specialty.

GILLIAM MFG. CO., Canton. Malleable iron castings of quality. Automobile, agriculture and general line of work.

THE OHIO ALUMINUM & BRONZE FOUNDRY CO., Canton. Aluminum, bronze and pure copper castings. Specialists in acid resisting bronzes.

THE CINCINNATI STEEL CASTINGS CO., Cincinnati. Queen City and Spring Grove Aves., Electric process steel castings only.

HAVEN MALLEABLE CASTINGS CO., Cincinnati. Light malleable iron castings for automobile and hardware purposes.

THE ACME-PALMERS & DEMOOY FOUNDRY CO., Cleveland, 5271 Sweeney Ave. Light and medium weight gray iron castings.

CITY BRASS FOUNDRY CO., Cleveland, 5314 St. Clair Ave. Aluminum, brass, bronze quality castings, one ounce to two tons.

CRUCIBLE STEEL CASTING CO., Cleveland. Electric steel castings. Specialize in nickel-chrome alloys for abrasive wear and high ultimates.

THE CUYAHOGA FOUNDRY CO., Cleveland. Gray iron and semi-steel; machine tool and pressure tested castings.

THE FOREST CITY FOUNDRY & MFG. CO., Cleveland. Light gray iron castings and warm air furnaces.

THE FULTON FDRY. & MCH. CO., Cleveland. Chemical, gray iron, and semi-steel castings, medium and heavy. Machine shop in connection.

KILBY MFG. CO., Cleveland. Gray iron, semi-steel castings, all kinds. Sugar machinery specialty. Tank, machine, pattern shops.

THE KING BRONZE & ALUMINUM FOUNDRY CO., Cleveland. General castings. Specialists chilled gear alloys, heavy duty bearing bronzes.

W. R. McDONOUGH & CO., Cleveland, 620 National Bldg. Steel, malleable and gray iron castings, one ounce to 150,000 lbs., all specifications.

WEST PARK FOUNDRY CO., Cleveland. Air compressor, diverter grids, electrical, plumbing goods, stove plates, light and medium gray iron.

THE ZELLNER FOUNDRY CO., Cleveland, 2020 Center St. Iron and semi-steel castings from 1 to 10,000 lbs.

THE ADVANCE FOUNDRY CO., Dayton. Gray iron, semi-steel, white iron. Light and heavy. Send blueprints. Pattern and machine shop.

THE AMERICAN CRUCIBLE PRODUCTS CO., Elyria. Brass, bronze and aluminum castings. Machined parts. Mill brasses a specialty.

THE EUCLID FOUNDRY CO., Euclid, (near Cleveland) Gray iron up to 6 tons. Strictly a job foundry, organized for service on small orders.

THE AMERICAN FOUNDRY & MACHINE CO., Hamilton. Gray iron, semi-steel; light and heavy. Manufacture ranges, hot plates, heaters.

THE LOGAN FOUNDRY & MACHINE CO., Logan. Gray iron castings; pattern and machine shop.

THE AMERICAN MALLEABLE CASTINGS CO., Marion. Certified malleable iron castings for all purposes.

OHIO

THE MIDWEST CASTING CO., Middletown. Makers of malleable iron castings of every description. Either jobbing or productive basis.

THE SILVER MFG. CO., Salem. Gray iron castings, light and medium. Machined if desired.

THE BROWN CLUTCH CO., Sandusky. Gray iron and semi-steel castings of quality up to 5 tons. Also small parts in brass, bronze and aluminum.

THE G. & C. FOUNDRY CO., Sandusky. Light and medium weight soft gray iron and semi-steel castings.

THE ARMSTRONG MFG. CO., Springfield. Gray iron and 50% or more open hearth steel castings, 1 to 10,000 lbs. Pattern, machine shops.

THE OHIO STEEL FDRY CO., Springfield, Lima, Bucyrus. Large open hearth steel castings. Light electric steel, finished steel, alloy castings.

THE SPRINGFIELD ALUMINUM PLATE & CASTINGS CO., Springfield. Aluminum castings and match plates. First class work.

PENNSYLVANIA

HOWARD STOVE CO., Beaver Falls. Gray iron 1 to 50 lbs. Exceptionally high grade as to finish and machining qualities.

IDEAL FOUNDRY & MACHINERY CO., Beaver Falls. Gray iron 1 lb. to 5 tons. Brass and aluminum castings, pattern and machine shops.

DAVIES & THOMAS CO., Catasauqua, (N. Y. Office, 342 Madison Ave.) Gray iron up to 10,000 lbs. Complete machine and pattern shops.

THE WOLF CO., Chambersburg. Gray iron castings. Machine and pattern shop.

CLEARFIELD MACHINE CO., Clearfield. Clay working and ore reduction machinery. Heavy gray iron and semi-steel castings, rough or finished.

STANDARD ENGINEERING CO., Ellwood City. Heavy gray iron, emi-steel and air furnace iron astings. Pattern and machine shops.

ALLEN MACHINE CO., Erie. Gray iron castings up to 50 tons. Chilled iron rolls. Machine and pattern shop.

ERIE CITY IRON WORKS, Erie. Gray iron castings up to 20 tons; mixtures by analysis; machine and pattern shops.

THE KELLY & JONES CO., Green burg. Electric furnace steel castings of eve y description rough or machined. Large capacity; quality work.

GROVE CITY BRASS & BRONZE CO., Grove City. Brass, bronze and aluminum. Mill and machinery castings. Inquiries olicited.

CONFER, SMITH & CO., INC., Hamburg. Light gray iron, jobbing, stove repairs, plumbing specialties. Equipped with and blast.

KENNETT FOUNDRY & MACHINE CO., Kennett Square. Chilled and gray iron castings, light and up to 5 tons. Machine, pattern shops.

CARBON STEEL CASTING CO., Lancaster. Annealed castings. Small light work a specialty. Hardware and kindred lines. Uniform quality.

LANCASTER FOUNDRY CO., Lancaster. Malleable castings, rough or machined, tinned or galvanized. Complete pattern department.

LITTLESTOWN HARDWARE & FOUNDRY CO., INC., Littlestown. Light gray iron, nickeling, japanning, machining, pattern making.

TAYLOR-WILSON MFG. CO., McKees Rocks. Gray iron to 10 tons. Semi-steel machine molded g ars. Machine and pattern shops.

PHOENIX IRON WORKS CO., Samuel E. Duff, Receiver, Meadville. Heavy gray iron, semi-steel; rough or machined. Pattern and machine shop.

NORTH WALES MACHINE CO., INC., North Wales. Gray iron, superior quality machine or hand-molded, sand blasted, pickled or tumbled.

AMERICAN ENGINEERING CO., Philadelphia, Aramingo & Cumberland Sts. Gray iron and semi-steel from 1 to 24,000 lbs. Long and varied experience.

AMERICAN MANGANESE BRONZE CO., Philadelphia. Every commercial grade; specialists high test and heavy. Pattern and machine shops.

PENNSYLVANIA

THOMAS DEVLIN MFG. CO., Philadelphia, Third St. & Lehigh Ave. Malleable and soft gray iron castings.

PITTSBURGH METER CO., Pittsburgh. Brass, bronze and white metal castings. Capacity quarter million pounds monthly. Duplicate work.

GRAY IRON FOUNDRY CO., Reading. Specializing on small castings of every description for machining or hand molded, tumbled or sand blasted.

PENN FOUNDRY & MFG. CO., Reading. Gray iron and semi-steel up to 3000 lbs. rough or machined. Cylinders, pistons, and intricate core work.

MARION MACHINE, FOUNDRY & SUPPLY CO., Scottdale. Gray iron, semi-steel, up to 20,000 lbs. Building specialties; pattern, machine work.

DOMESTIC ENGINE & PUMP CO., Shipp nsburg. G ay iron castings up to 3000 lbs. Strong, soft, easily machined.

THE SHOOP BRONZE CO., Tarentum. Mill bearings, bushings, pickle crate , hydraulic, aluminum castings, large, small, rough or machined.

PENN MFG. & SUPPLY CO., Washington. Gray iron and semi-steel castings to 4,000 lbs. Pattern, forge and machine shops. Oil well tools.

WRIGHTSVILLE HARDWARE CO., Wrightsville. Small, soft gray iron castings; plain or machined; japanned, plated, tinned or galvanized.

RHODE ISLAND

UNIVERSAL WINDING CO., Providence, 1655 Elmwood Ave. Soft gray iron; free machining; quan. production; charcoal mixture, up to 6,000 lbs.

TENNESSEE

DODGE FOUNDRY CO., Chattanooga. Manufacturers of high grade gray iron machine castings, 1 lb. to 15 tons. Daily capacity 50 tons.

CLARKSVILLE FOUNDRY & MACHINE WORKS, Clarksville. Gray iron, brass and aluminum castings; machine and pattern shop.

VERMONT

LYNDONVILLE BRASS FOUNDRY, Lyndonville. Brass, bronze and aluminum castings. Railroad work a specialty.

VIRGINIA

WALKER IRON WORKS, INC., Charlottesville. Gray iron castings, all kinds, light and medium weight a specialty, railway and city work.

SALEM FOUNDRY & MACHINE WORKS, INC., Salem. Gray iron, 1 lb. to 10 tons. Brass and aluminum castings, pattern and machine shops.

SNAPP FOUNDRY, INC., Winchester. Municipal, lime kiln and general gray iron castings. Machine shop and mill supply jobbers.

WISCONSIN

JAMES MFG. CO., Fort Atkinson. Quality malleable or gray iron castings in production quantities. Machine and pattern shops.

MOLOCH CO., Kaukauna. Gray iron, semi-steel or brass castings up to ten tons. Special machinery built. Pattern and machine shops.

GISHOLT MACHINE CO., Madison. Gray iron, semi-steel, brass and bronze castings, with complete pattern and machine shop facilities.

WISCONSIN FDRY. & MACHINE CO., Madison. Gray iron, semi-steel, brass and aluminum. Match plates; pattern, jobbing machine work.

CHAIN BELT CO., Milwaukee. Certified malleable, gray iron, semi-steel and chilled castings in production quantities.

UNIVERSAL FOUNDRY CO., Oshkosh. Gray iron. Auto, hardware, electrical machinery. Wood, metal patterns. Production mat:h plates.

THE LIBERTY FOUNDRY, INC., Wauwatosa. Light gray iron. Hardware, auto, electrical. Production work; pattern shop.

GERLINGER ELECTRIC STEEL CASTINGS CO., West Allis. Electric steel 1-lb. to 3 tons; road mchy., truck, tractor, mining, general mchy.

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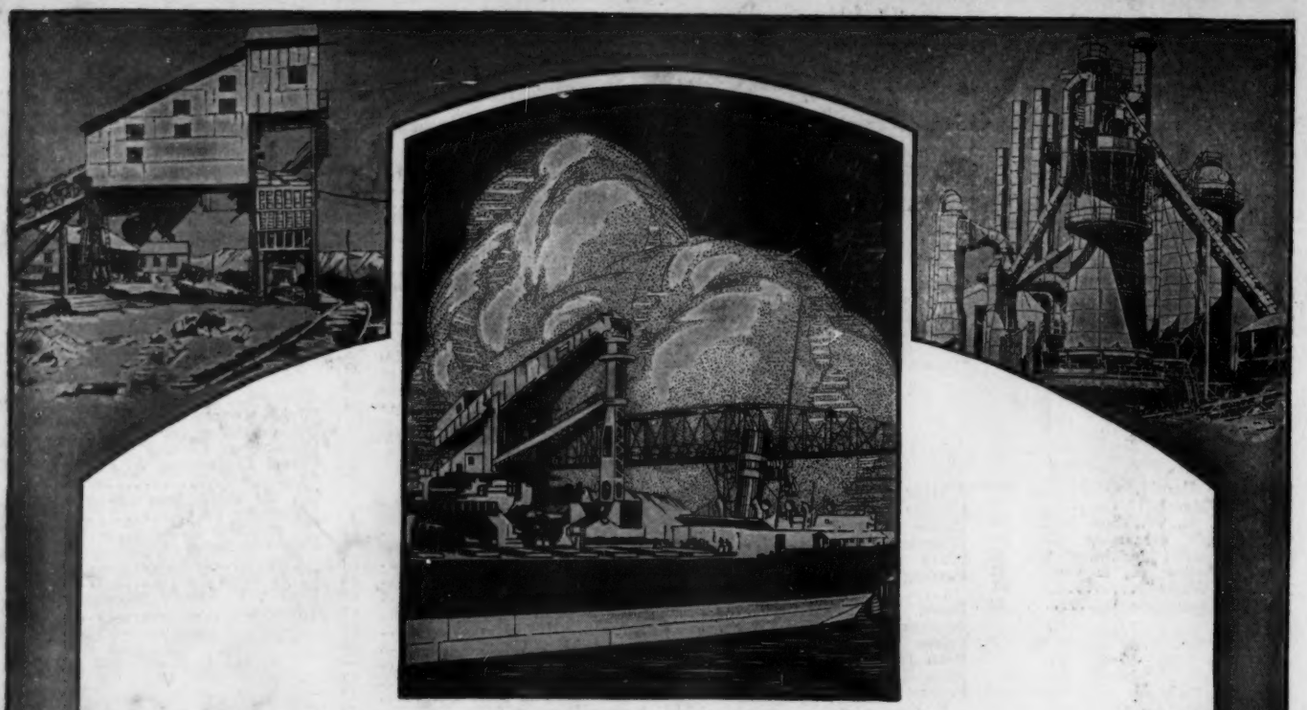

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IRON ORE
COAL

THE M.A. HANNA CO.

CLEVELAND

Buffalo Pittsburgh Detroit
Cincinnati Philadelphia Toronto
New York Chicago Toledo
Williamsport Baltimore

HANNA